Java DB Tools and Utilities Guide

Version 10.5

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Relationship between Java(TM) DB and Derby

Java(TM) DB is a relational database management system that is based on the Java programming language and SQL. Java DB is a commercial release of the Apache Software Foundation's (ASF) open source relational database project. The Apache project is called Derby.

The Java DB product includes Derby without any modification whatsoever to the underlying source code.

Technical support is available for purchase for the Java DB product through Sun.

Because Java DB and Derby have the same functionality, the Java DB documentation refers to the core functionality as Derby.

Java DB Version 10.5 is based on the Derby Version 10.5 release. References to "Derby" in the Java DB documentation refer to the Version 10.5 release of Apache Derby.

About this guide

For general information about the Derby documentation, such as a complete list of books, conventions, and further reading, see *Getting Started with Java DB*.

Purpose of this document

This book describes how to use the Derby tools and utilities. The tools and utilities covered in this book include:

- ij
- the import and export utilities
- the jar file utilities
- sysinfo
- dblook
- SignatureChecker

Audience

This book is for:

- developers, who might use the tools when developing applications
- system administrators, who might use the tools to run backup scripts or to import large amounts of data
- end-users, who might use one of the tools to run ad-hoc queries against a database

How this guide is organized

This guide includes the following sections:

- What are the Derby tools and utilities?

  Overview of the tools and utilities, and Derby and JDBC basics for new or infrequent users.
- Using ij

  How to get started with `ij`, a JDBC and SQL scripting tool.
- ij properties reference

  Reference for `ij` properties.
- ij commands and errors reference

  Reference for `ij` commands and errors.
- Using the bulk import and export procedures

  Reference and how-to instructions for using bulk import and export.
- Storing jar files in a database

  Syntax for executing the built-in procedures for storing jar files in the database.
- sysinfo

  Reference information on the utility that provides information about your Derby environment.
- dblook

  Reference information for a utility that dumps the DDL of a user-specified database to either a console or a file.
- SignatureChecker

Reference information for a tool that identifies any SQL functions and procedures in a database that do not follow the SQL Standard argument matching rules.

What are the Derby tools and utilities?

The Derby tools and utilities are a set of routines supplied with Derby that are typically used to setup and update a Derby database.

For more complete information on developing a system using Derby, see the *Java DB Developer's Guide*.

Overview

Derby is a database management system (DBMS), accessed by applications through the JDBC API.

Included with the product are some standalone Java tools and utilities that make it easier to use and develop applications for Derby.

These tools and utilities include:

- *ij*

  `ij` is Derby's interactive JDBC scripting tool. It is a simple utility for running scripts against a Derby database. You can also use it interactively to run ad hoc queries. `ij` provides several commands for ease in accessing a variety of JDBC features.

  `ij` can be used in an embedded or a client/server environment.
- *The import and export utilities*

  These server-side utilities allow you to import data directly from files into tables and to export data from tables into files. Server-side utilities can be in a client/server environment but require that all files referenced be on the Server machine.
- *The jar file utilities*

  These utilities allow you to store jar files in a database.
- *sysinfo*

  `sysinfo` provides information about your version of Derby and your environment.
- *dblook*

  `dblook` is Derby's Data Definition Language (DDL) Generation Utility, more informally called a schema dump tool. It is a simple utility that dumps the DDL of a user-specified database to either a console or a file. The generated DDL can then be used for such things as recreating all or parts of a database, viewing a subset of a database's objects (for example, those which pertain to specific tables and schemas), or documenting a database's schema.
- *SignatureChecker*

  The `SignatureChecker` tool identifies any SQL functions and procedures in a database that do not follow the SQL Standard argument matching rules.

Environment setup and the Derby tools

`ij`, `sysinfo`, `dblook`, and `SignatureChecker` are tools that can be used in an embedded or a client/server environment. The import and export utilities and jar file utilities are database-side utilities, which means that they run in the same JVM as Derby (that is, on the server). This means when used in a client/server environment all files imported, exported, or loaded must be local to the server machine.

Java 2 Platform, Standard Edition, Version 1.4

All Derby tools require the Java 2 Platform, Standard Edition, Version 1.4 or later.

Classpath

To simplify the process of setting up the `CLASSPATH` environment variable to run Derby and the tools, a new jar file, `derbyrun.jar`, has been added to the Derby distribution. Adding this jar file to your classpath has the effect of putting all the Derby jar files in your classpath.

For details on using the Derby jar files for deploying applications, see the sections on deploying Derby applications in the *Java DB Developer's Guide*.

About Derby databases

A Derby database consists of platform-independent files stored in a directory that has the same name as the database.

JDBC connection basics

Most of the Derby tools are JDBC applications. A JDBC application is one that uses the classes in the *java.sql* package to interact with a DBMS.

When you work with JDBC applications, you need to know about several concepts. The most basic is the *connection*. A *JDBC connection* is the object through which commands are sent to the Derby engine and responses are returned to the program. Establishing a *connection* to a specific database is done by specifying a appropriate database *URL*. The following sections provide background information to help in understanding the Derby database connection URL.

JDBC drivers overview

Before a JDBC application connects to a database, it must cause the proper JDBC driver to be loaded in the Java session. Derby provides the following JDBC drivers for use with the Derby database engine:

- *org.apache.derby.jdbc.EmbeddedDriver*

  For embedded environments, when Derby runs in the same JVM as the application. This is commonly referred to as the embedded drvier.
- *org.apache.derby.jdbc.ClientDriver*

  For client/server environments that use the Derby Network Server. This is commonly referred to as the Network Client driver.

You can use `ij` to connect to any database that supplies a JDBC driver. For those databases, you would need to load the supplied JDBC driver.

Database connection URLs

A JDBC URL provides a way of identifying a database so that the appropriate driver recognizes it and connects to it. In the Derby documents, a JDBC URL is referred to as a database connection URL.

After the driver is loaded, an application must specify the correct database connection URL to connect to a specific database. The Derby database connection URL allows you to accomplish tasks other than simply connecting. For more information about the Derby database connection URLs, see the *Java DB Developer's Guide*.

A JDBC URL always starts with *jdbc:*. After that, the format for the database connection URL depends on the JDBC driver.

Here is the format for the database connection URL for connecting to an existing Derby database using the embedded driver:

- jdbc:derby:*databaseName*;*URLAttributes*

The format for the database connection URL for connecting to an existing Derby database using the Network Client is:

- jdbc:derby://*host:port*/*databaseName*;*URLAttributes*

The italicized items stand for something the user fills in:

- *databaseName*

  The name of the database you want to connect to. This might also include the file system path to the database.
- *URLAttributes*

  One or more of the supported attributes of the database connection URL, such as *upgrade=true*, *create=true* or *territory=ll_CC*. For more information, see "Setting attributes for the database connection URL" in the *Java DB Reference Manual*.
- *host*

  The name of the machine where the server is running. It can be the name of the machine or the address.
- *port*

  The port number used by the server framework

About Protocols

Officially, the portion of the database connection URL called the protocol is *jdbc:*, just as *http://* is a protocol in Web URLs. However, the second portion of the database connection URL (everything between *jdbc:* and *databaseName*), which is called the subprotocol, is informally considered part of the protocol. Later in this book you might see references to protocol. Consider protocol to be everything that comes before *databaseName*.

For complete information about the database connection URL, see the *Java DB Developer's Guide*.

Tools and localization

The Derby tools provide support for common localization features such as localized message files and GUI, locale-appropriate formatting of data, codesets, unicode identifiers and data, and database territories.

For general information about international Derby systems, see the *Java DB Developer's Guide*.

About locales

In the Derby documentation, we refer to three locales:

- *Java System locale*

  This is the locale of your machine, which is automatically detected by your JVM. For Derby and Derby tools, the Java system locale determines the default locale.
- *Database territory*

  This is the territory associated with your database when it is created. By default, this is the same as the java system locale. The database territory determines the language of database errors.
- `ij` *or* `dblook` *Session locale*

This locale is associated with your `ij` or `dblook` session. This locale determines the localized display format for numbers, dates, times, and timestamps.

Database territory

To specify a database territory, use the *territory* attribute on the URL connection when creating the database.
Note: You cannot modify a database's territory after the database has been created.

For information about database territories, see the Internationalization appendix in the *Java DB Developer's Guide*.

Specifying an alternate codeset

You can specify an alternate codeset for your tool session.

Use the *derby.ui.codeset* property when starting `ij` or `dblook`. This property can be useful when working with scripts created on a different system.

Formatting display of locale-sensitive data

To display dates, timestamps, numbers, and times in the format of the `ij` Session locale, use the *LocalizedDisplay* command.
Note: These options do not change how Derby*stores* locale-sensitive data, simply how the tool displays the data.

The following example demonstrates using *localizedDisplay* in an *en_US* locale:

```
ij> VALUES CURRENT_DATE;
1
----------
2001-09-06
1 row selected
ij> localizeddisplay on;
ij> VALUES CURRENT_DATE;
1
-----------------
September 6, 2001
1 row selected
```

Using ij

ij is Derby's interactive JDBC scripting tool. It is a simple utility for running scripts or interactive queries against a Derby database.

ij is a Java application, which you start from a command window such as an MS-DOS Command Window or the UNIX shell. ij provides several non-SQL commands for ease in accessing a variety of JDBC features for testing.

Starting ij

Derby provides batch and shell scripts for users in Windows and UNIX environments that can be used to start ij. By calling the appropriate script you will start ij and be able to connect with a simple command. The scripts are found in the `bin` directory of your Derby installation. You can also customize the ij scripts to suit your environment.

If you are using Derby as a client/server environment, start the Network Server before connecting to the Derby database. (See "Starting the Network Server" in the *Java DB Server and Administration Guide* for details.) You can start ij by running the ij scripts for your environment. Follow the instructions in "Setting up your environment" in *Getting Started with Java DB* to set the `DERBY_HOME` and `JAVA_HOME` environment variables and to add `DERBY_HOME/bin` to your path. Then use the following command:

```
ij [-p propertyFile] [inputFile]
```

Alternatively, set the `DERBY_HOME` environment variable, then use one of these commands:

```
(UNIX) java [options] -jar $DERBY_HOME/lib/derbyrun.jar ij
    [-p propertyFile] [inputFile]
```

```
(Windows) java [options] -jar %DERBY_HOME%\lib\derbyrun.jar ij
    [-p propertyFile] [inputFile]
```

```
java [options] org.apache.derby.tools.ij
    [-p propertyFile] [inputFile]
```

If you use the last form of the command, be sure that derbyrun.jar is in your classpath (for pre-10.2 distributions derbytools.jar and usually derby.jar were required in the classpath).

The command line items are:

- **`java`**

  Start the JVM.
- ***`options`***

  The options that the JVM uses. You can use the -D option to set ij properties (see Starting ij using properties) or system properties, such as Derby properties.
- ***`propertyFile`***

  A file you can use to set ij properties (instead of the -D option). The property file should be in the format created by the java.tools.Properties.save methods, which is the same format as the derby.properties file.
- ***`inputFile`***

  A file from which to read commands. The ij tool exits at the end of the file or an exit command. Using an input file causes ij to print out the commands as it runs them. If you reroute standard input, ij does not print out the commands. If you do not supply an input file, ij reads from the standard input.

For detailed information about ij commands, see ij commands and errors reference.

Creating a database using `ij`

You can create a Derby from within the `ij` tool.

1. To create a database with the `ij` tool, type the following command:

   ```
   ij> connect 'jdbc:derby:testdb;create=true';
   ```

   This command creates a database called `testdb` in the current directory, populates the system tables, and connects to the database. You can then run any SQL statements from the `ij` command line.

Starting ij using properties

You set ij properties in any of the following ways:

1. by using the -D option on the command line
2. by specifying a properties file using the `-p propertyfile` option on the command line

Remember: ij property names are case-sensitive, while commands are case-insensitive.

The following examples illustrate how to use ij properties:

To start ij by using a properties file called `ij.properties`, use a command like the following (with the addition of the file paths):

```
java -jar derbyrun.jar -p ij.properties
```

To start ij with a maximumDisplayWidth of 1000:

```
java -Dij.maximumDisplayWidth=1000 -jar derbyrun.jar
```

To start ij with an ij.protocol of **jdbc:derby:** and an ij.database of **sample**, use the following command:

```
java -Dij.protocol=jdbc:derby: -Dij.database=sample derbyrun.jar
```

To start ij with two named connections, using the ij.connection.connectionName property, use a command like the following (all on one line):

```
java -Dij.connection.sample=jdbc:derby:sample
-Dij.connection.History=jdbc:derby:History
-Dderby.system.home=c:\derby\demo\databases
-jar c:\derby\lib\derbyrun.jar
```

To see a list of connection names and the URLs used to connect to them, use the following command. (If there is a connection that is currently active, it will show up with an * after its name.)

```
ij version 10.5
ij(HISTORY)> show connections;
HISTORY* -    jdbc:derby:History
SAMPLE -     jdbc:derby:sample
* = current connection
ij(HISTORY)>
```

Getting started with ij

This section discusses the use of the ij tool.

Connecting to a Derby database

To connect to a Derby database, you need to perform the following steps:

1. Start the JVM
2. Load the appropriate driver.
3. Create a connection by providing a valid database connection URL.

When using ij interactively to connect to a Derby database connection information is generally supplied on the full database connection URL. ij automatically loads the appropriate driver based on the syntax of the URL. The following example shows how to connect in this manner by using the **Connect** command and the embedded driver:

```
D:>java org.apache.derby.tools.ij
ij version 10.5
ij> connect 'jdbc:derby:sample';
ij>
```

If the URL entered contains Network Client information the **Connect** command loads the Network Client driver:

```
D:>java org.apache.derby.tools.ij
ij version 10.5
ij> connect 'jdbc:derby://localhost:1527/sample';
ij>
```

Note: In these and subsequent examples the databases were created in the derby.system.home directory. For more information on the System Directory see the *Java DB Developer's Guide*.

ij provides alternate methods of specifying part or all of a connection URL (e.g. the ij.protocol, ij.database, or ij.connection.connectionName properties). These properties are often used when a script is being used and the path to the database or the driver name is not known until runtime. The properties can also to used to shorten the amount of information that must be provided with the connection URL. The following are some examples of different ways to supply the connection information:

- Supplying full connection information on the command line
  Specifying one of the following properties along with a valid connection URL on the ij command line starts ij with the connection already active. This is often used when running a SQL script so the database name or path can be specified at runtime.
  - ij.database - opens a connection using the URL provided
  - ij.connection.*connectionName* - Used to open one or more connections. The property can appear multiple times on the command line with different *connectionName*s and the same or different URLs.

  This example shows how to create the database *myTours* and run the script *ToursDB_schema.sql* by specifying the database URL using the ij.database property.

```
C:\>java -Dij.database=jdbc:derby:myTours;create=true
     org.apache.derby.tools.ij
    %DERBY_HOME%\demo\programs\toursdb\ToursDB_schema.sql
ij version 10.5
CONNECTION0* -  jdbc:derby:myTours
* = current connection
ij> -- Licensed to the Apache Software Foundation (ASF) under one or
 more
-- contributor license agreements.  See the NOTICE file distributed
 with
     ...output removed...
ij> CREATE TRIGGER TRIG2 AFTER DELETE ON FLIGHTS FOR EACH STATEMENT
 MODE DB2SQL
INSERT INTO FLIGHTS_HISTORY (STATUS) VALUES ('INSERTED FROM TRIG2');
0 rows inserted/updated/deleted
```

```
ij>
```

- Defining a Protocol and using a "short form" URL

  A default URL protocol and subprotocol can be specified by setting the property ij.protocol or using the ij Protocol command. This allows a connection to be made by specifying only the database name. This "short form" of the database connection URL defaults the protocol (For more information, see About Protocols).

  This example uses the ij Protocol command and a "short form" connection URL:

```
D:>java org.apache.derby.tools.ij
ij version 10.5
ij> protocol 'jdbc:derby:';
ij> connect 'sample';
ij>
```

- Specifying an alternate Driver

  If you are using the drivers supplied by Derby, you can specify the driver names listed in JDBC drivers overview. However, the Derby drivers are implicitly loaded when a supported protocol is used so specifying them is probably redundant. Specifying a driver is required when ij is used with other JDBC drivers to connect to non-Derby databases. To use drivers supplied by other vendors explicitly specify the driver one of three ways

  - with an ij property ij.Driver
  - using the JVM system property `jdbc.drivers`
  - using the ij Driver command

  This example specifies the driver using the ij Driver command

```
D:>java org.apache.derby.tools.ij
ij version 10.5
ij> driver 'sun.jdbc.odbc.JdbcOdbcDriver';
ij> connect 'jdbc:odbc:myOdbcDataSource';
ij>
```

The ij Driver name and connection URL

Specifying the Driver Name and database connection URL, summarizes the different ways to specify the driver name and database connection URL.

Table 1. Specifying the Driver Name and database connection URL

Action	System Property	ij Property	ij Command
loading the driver implicitly	'	*ij.connection.connection*N (plus full URL) *ij.database* (plus full URL) *ij.protocolij.protocol* (plus protocol clause in Connect command)	*ProtocolConnect* (plus full URL)
loading the driver explicitly	*jdbc.drivers*	-D*ij.Driver*	*Driver*
specifying the database connection URL	'	*ij.connection.connection*N	*Connect*

Using ij commands

The primary purpose of ij is to allow the execution of Derby SQL statements interactively or via scripts. Since SQL statements can be quite long, ij uses the semicolon to mark the end of a statement or command. All statements and commands must be terminated with

a semicolon. If you press Return before terminating a statement or command, ij places a continuation character (>) at the beginning of the next line.

ij uses properties, listed in ij properties reference, to simplify its use.

ij also recognizes specialized commands that provide additional features, such as the ability to create and test cursors and prepared statements, transaction control, and more. For complete information about ij commands, see ij commands and errors reference.

Other uses for ij

ij is a JDBC-neutral scripting tool with a small command set. It can be used to access any JDBC driver and database accessible through that driver.

The main benefit of a tool such as ij is that it is easy to run scripts for creating a database schema and automating other repetitive database tasks.

In addition, ij accepts and processes SQL commands interactively for ad hoc database access.

Running ij scripts

You can run scripts in ij in any of the following ways:

- Name an input file as a command-line argument.

  For example:

  ```
  java org.apache.derby.tools.ij <myscript.sql>
  ```
- Redirect standard input to come from a file.

  For example:

  ```
  java org.apache.derby.tools.ij < <myscript.sql>
  ```
- Use the Run command from the ij command line.

  For example:

  ```
  ij> run 'myscript.sql';
  ```

Note: If you name an input file as a command-line argument or if you use the Run command, ij echoes input from a file. If you redirect standard input to come from a file, ij does not echo commands.

You can save output in any of the following ways:

- By redirecting output to a file:

  ```
  java org.apache.derby.tools.ij <myscript.sql> > <myoutput.txt>
  ```
- By setting the `ij.outfile` property:

  ```
  java -Dij.outfile=<myoutput.txt> org.apache.derby.tools.ij
      <myscript.sql>
  ```

ij exits when you enter the Exit command or, if executing a script, when the end of the command file is reached. When you use the Exit command, ij automatically shuts down an embedded Derby system by issuing a `connect jdbc:derby:;shutdown=true` request. It does not shut down Derby if it is running in a server framework.

ij properties reference

When starting up`ij`, you can specify properties on the command line or in a properties file, as described in Starting ij using properties.

ij.connection.*connectionName* property

Function

Creates a named connection to the given database connection URL when `ij` starts up; it is equivalent to the Connect AS *Identifier* command. The database connection URL can be of the short form if an *ij.protocol* is specified. This property can be specified more than once per session, creating multiple connections. When `ij` starts, it displays the names of all the connections created in this way. It also displays the name of the current connection, if there is more than one, in the `ij` prompt.

Syntax

```
ij.connection.connectionName=databaseConnectionURL
```

When specified on the command line the *databaseConnectionURL* should not be enclosed in single quotations, however, if the database path contains special characters (e.g. a space) it must be enclosed in double quotes.

Example

This example connects to the existing database *sample* and creates then connects to the database *anohterDB*.

```
D:> java -Dij.connection.sample1=jdbc:derby:sample
-Dij.connection.anotherConn=jdbc:derby:anotherDB;create=true
    org.apache.derby.tools.ij
ij version 10.5
ANOTHERCONN* -  jdbc:derby:anotherDB;create=true
SAMPLE1 -        jdbc:derby:sample
* = current connection
ij(ANOTHERCONN)>
```

See also

- Connect command

ij.database property

Function

Creates a connection to the database name listed indicated by the property when `ij` starts up. You can specify the complete connection URL (including protocol) with this property or just the database name if you also specify *ij.protocol* on the command line. After it boots, `ij` displays the generated name of the connection made with this property.

Syntax

```
ij.database=databaseConnectionURL
```

When specified on the command line the *databaseConnectionURL* should not be enclosed in single quotations, however, if the database path contains special characters (e.g. a space) it must be enclosed in double quotes.

Example

```
java -Dij.protocol=jdbc:derby:
```

```
    -Dij.database=wombat;create=true org.apache.derby.tools.ij
ij version 10.5
CONNECTION0* -  jdbc:derby:wombat
* = current connection
ij>
```

ij.dataSource property

Function

The `ij.dataSource` property specifies the datasource to be used to access the database. When specifying a datasource, `ij` does not use the DriverManager mechanism to establish connections.

Syntax

When you set the `ij.dataSource` property `ij` will automatically try to connect to a database. To establish a connection to a specific database using `ij.dataSource`, set the `ij.dataSource.databaseName` property. If you do not set this property, `ij` will start with an error. If you want to create the database, specify the `ij.dataSource.createDatabase` property as well as `ij.dataSource.databaseName`. Do not specify `ij.protocol` when setting `ij.dataSource` as that would activate the DriverManager mechanism.

```
ij.dataSource=datasource class name
ij.dataSource.databaseName=databasename
[ij.dataSource.createDatabase=create]
```

If you do not specify `ij.dataSource.databaseName` and get an error indicating no database was found, you can still connect to a database by using `ij`'s `connect` command. You should not specify the protocol (for example jdbc:derby:) in the `connect` command when using `ij.dataSource`.

Example 1

In the following example, `ij` connects to a database named `sample` using an `EmbeddedDataSource`. The `sample` database is created if it does not already exist.

```
#
# If your application runs on JDK 1.6 or higher, then you should
# specify the JDBC4 variant of this DataSource:
# org.apache.derby.jdbc.EmbeddedDataSource40.
# If your application runs with a jvm supporting JSR169, you cannot use
# org.apache.derby.jdbc.EmbeddedDataSource, instead, use:
# org.apache.derby.jdbc.EmbeddedSimpleDataSource.
#
java -Dij.dataSource=org.apache.derby.jdbc.EmbeddedDataSource
-Dij.dataSource.databaseName=sample -Dij.dataSource.createDatabase=create
  org.apache.derby.tools.ij
ij version 10.5
CONNECTION0*
* = current connection
ij>
```

Example 2

In the following example, `ij` starts using an `EmbeddedSimpleDataSource`, without specifying `ij.dataSource.databaseName`. This results in an error indicating no database was found. After the error, the `connect` command is used to create and connect to a database named `smalldb`.

```
#
# Start ij using EmbeddedSimpleDataSource
```

```
#
java -Dij.dataSource=org.apache.derby.jdbc.EmbeddedSimpleDataSource
  org.apache.derby.tools.ij
ERROR XJ004: Database '' not found.
ij version 10.5
ij> connect 'smalldb;create=true';
ij>
```

For more information about DataSources, refer to the JDBC documentation and "Using Derby as a J2EE Resource Manager" in the *Java DB Developer's Guide*.

ij.driver property

Function

Loads the JDBC driver that the class specifies.

Syntax

```
ij.driver=JDBCDriverClassName
```

Notes

Example

```
D:>java -Dij.driver=sun.jdbc.odbc.JdbcOdbcDriver
 org.apache.derby.tools.ij
ij version 10.5
ij> Connect 'jdbc:odbc:MyODBCDataSource';
ij>
```

See also

- Driver command

ij.exceptionTrace property

Function

When the `ij.exceptionTrace` property is set to `true`, a full exception stack trace is printed when exceptions occur in `ij`. The default setting is `false`.

Syntax

```
ij.exceptionTrace={ false | true }
```

Example

In the following example, `ij` is started with the `ij.exceptionTrace` property set to true.

```
java -Dij.exceptionTrace=true org.apache.derby.tools.ij
ij version 10.5
ij> connect 'jdbc:derby:wombat';
ERROR XJ004: Database 'wombat' not found.
SQL Exception: Database 'wombat' not found.
    at
 org.apache.derby.impl.jdbc.SQLExceptionFactory.getSQLException(SQLExceptionFactory.jav
    at org.apache.derby.impl.jdbc.Util.newEmbedSQLException(Util.java:87)
    at org.apache.derby.impl.jdbc.Util.newEmbedSQLException(Util.java:93)
    at
 org.apache.derby.impl.jdbc.Util.generateCsSQLException(Util.java:172)
    at
 org.apache.derby.impl.jdbc.EmbedConnection.newSQLException(EmbedConnection.java:1955)
    at
 org.apache.derby.impl.jdbc.EmbedConnection.(EmbedConnection.java:254)
```

```
    at
 org.apache.derby.impl.jdbc.EmbedConnection30.(EmbedConnection30.java:72)
    at
 org.apache.derby.jdbc.Driver30.getNewEmbedConnection(Driver30.java:73)
    at
 org.apache.derby.jdbc.InternalDriver.connect(InternalDriver.java:200)
    at java.sql.DriverManager.getConnection(DriverManager.java:512)
    at java.sql.DriverManager.getConnection(DriverManager.java:140)
    at org.apache.derby.impl.tools.ij.ij.dynamicConnection(ij.java:873)
    at org.apache.derby.impl.tools.ij.ij.ConnectStatement(ij.java:723)
    at org.apache.derby.impl.tools.ij.ij.ijStatement(ij.java:553)
    at org.apache.derby.impl.tools.ij.utilMain.go(utilMain.java:289)
    at org.apache.derby.impl.tools.ij.Main.go(Main.java:207)
    at org.apache.derby.impl.tools.ij.Main.mainCore(Main.java:173)
    at org.apache.derby.impl.tools.ij.Main14.main(Main14.java:55)
    at org.apache.derby.tools.ij.main(ij.java:60)  ij
ij>
```

ij.maximumDisplayWidth property

Function

Specifies the maximum number of characters used to display any column. The default value is 128. Values with display widths longer than the maximum are truncated and terminated with an *&* character.

Syntax

```
ij.maximumDisplayWidth=numberOfCharacters
```

Example

```
java -Dij.maximumDisplayWidth=1000 org.apache.derby.tools.ij
```

See also

- MaximumDisplayWidth command

ij.outfile property

Function

Specifies a file to which the system should direct output for a session. Specify the file name relative to the current directory, or specify the absolute path.

Syntax

```
ij.outfile=fileName
```

Example

```
java -Dij.outfile=out.txt org.apache.derby.tools.ij myscript.sql
```

ij.password property

Function

Specifies the password used to make connections. This property is used in conjunction with the *ij.user* property to authenticate a connection. If authentication is not active then these properties are ignored.

Syntax

```
ij.password=password
```

Example

```
java -Dij.user=me -Dij.password=mine org.apache.derby.tools.ij
```

See the *Java DB Developer's Guide* for more information on Derby authentication and security.

ij.protocol property

Function

Specifies the default protocol and subprotocol portions of the database connection URL for connections. The Derby protocol is:

- jdbc:derby:

Allows you to use a short form of a database name in a connection URL.

Syntax

```
ij.protocol=protocolForEnvironment
```

Example

```
D:>java -Dij.protocol=jdbc:derby:
    org.apache.derby.tools.ij
ij version 10.5
ij> Connect 'newDB;create=true';
ij>
```

See also

- Protocol command

ij.protocol.*protocolName* property

Function

This property is similar to the *ij.protocol* property. The only difference is that it associates a name with the value, thus allowing you to define and use more than one protocol. (See Connect command.)

Syntax

```
ij.protocol.protocolName=protocolForEnvironment
```

Example

```
D:>java -Dij.protocol.derby=jdbc:derby:
-Dij.protocol.emp=jdbc:derby: org.apache.derby.tools.ij
ij version 10.5
ij> Connect 'newDB' protocol derby as new;
ij>
```

See also

- Protocol command

ij.showErrorCode property

Function

Set this property to *true* to have ij display the *SQLException ErrorCode* value with error messages. The default is *false*.

Error codes denote the severity of the error. For more information, see the *Java DB Reference Manual*.

Syntax

```
ij.showErrorCode={ false | true }
```

Example

```
java -Dij.showErrorCode=true -Dij.protocol=jdbc:derby:
    org.apache.derby.tools.ij
ij version 10.5
ij> Connect 'sample';
ij> VLUES 1;
ERROR 42X01: Syntax error: Encountered "VLUES"
at line 1, column 1. (errorCode = 30000)
ij>
```

ij.showNoConnectionsAtStart property

Function

The `ij.showNoConnectionsAtStart` property specifies whether the connections message should be displayed when `ij` is started. Default is false, that is, a message indicating the current connections, if any, is displayed.

Syntax

```
ij.showNoConnectionsAtStart={ false | true }
```

Example

In the following example, `ij` connects to a previously created database named `sample` using an `EmbeddedDataSource`. The property `ij.showNoConnectionsAtStart` is set to true in the first session of the example, and set to false in the second session.

```
java -Dij.dataSource=org.apache.derby.jdbc.EmbeddedDataSource
-Dij.dataSource.databaseName=sample -Dij.showNoConnectionsAtStart=true
 org.apache.derby.tools.ij
ij version 10.5
ij> disconnect;
ij> exit;

java -Dij.dataSource=org.apache.derby.jdbc.EmbeddedDataSource
-Dij.dataSource.databaseName=sample -Dij.showNoConnectionsAtStart=false
 org.apache.derby.tools.ij
ij version 10.5
CONNECTION0*
* = current connection
ij> disconnect;
ij> exit;
```

ij.showNoCountForSelect property

Function

The `ij.showNoCountForSelect` property specifies whether to display messages indicating the number of rows selected. Default is false, that is, if the property is not set, select count messages are displayed.

Syntax

```
ij.showNoCountForSelect={ false | true }
```

Example

In the following example, `ij` is first started with the `ij.showNoCountForSelect` property to true, then with the property set to false.

```
java -Dij.showNoCountForSelect=true org.apache.derby.tools.ij
ij version 10.5
CONNECTION0*
* = current connection
ij> create table t1 (c1 int);
0 rows inserted/updated/deleted
ij> insert into t1 values 1, 2, 3;
3 rows inserted/updated/deleted
ij> select * from t1;
C1
-----------
1
2
3
ij> disconnect;
ij> exit;

java -Dij.showNoCountForSelect=false org.apache.derby.tools.ij
ij version 10.5
CONNECTION0*
* = current connection
ij> select * from t1;
C1
-----------
1
2
3

3 rows selected

ij>
```

ij.URLCheck property

Function

This property determines whether `ij` checks for invalid or non-Derby URL attributes when you are using the embedded driver. Set this property to *false* to prevent `ij` from validating URL attributes. The default value is *true*.

When the *ij.URLCheck* property is set to *true*, you are notified whenever a connection URL contains an incorrectly specified attribute. For example if the attribute name is misspelled or cased incorrectly `ij` prints a message.

Note: `ij` checks attribute *values* if the attribute has pre-defined values. For example, the attribute *shutdown* has the pre-defined values of *true* or *false*. If you try to set the attribute *shutdown* to a value other than *true* or *false*, `ij` displays an error. For example:

```
ij> Connect 'jdbc:derby:anyDB;shutdown=rue';
ERROR XJ05B: JDBC attribute 'shutdown' has an invalid value 'rue',
valid values are '{true|false}'.
ij>
```

Syntax

```
ij.URLCheck={ false | true }
```

Example

By default, `ij` displays messages about invalid attributes:

```
java org.apache.derby.tools.ij
```

```
ij version 10.5
ij> connect 'mydb;uSer=naomi';
URL Attribute [uSer=naomi]
   Case of the Derby attribute is incorrect.
```

The following command line specifies to turn off URL attribute checking in `ij`.

```
java -Dij.URLCheck=false org.apache.derby.tools.ij
ij version 10.5
ij> connect 'mydb;uSer=naomi';
ij>
```

Typically, you would only explicitly turn off the URL checker if you were using `ij` with a non-Derby JDBC driver or database.

Notes

The URL checker does not check the validity of properties, only database connection URL *attributes*.

For a list of attributes, see "Setting attributes for the database connection URL" in the *Java DB Reference Manual*. Because the *ij.URLCheck* property is valid only with the embedded driver, it does not apply to attributes such as *securityMechanism=value*, *ssl=sslMode*, and the attributes related to tracing.

ij.user property

Function

Specifies the logon name used to establish the connection. This property is used in conjunction with the *ij.password* property to authenticate a connection. If authentication is not active then these properties are ignored.

When a username is supplied you need to be aware of the database schema. When you connect using `ij.user`, the default database schema applied to all SQL statements is the same as the user id provided even if the schema does not exist. Use the SET SCHEMA statement to change the default when the schema does not match the username. Alternately you can fully qualify the database objects referred to in the SQL statements . If no user is specified, no SET SCHEMA statement has been issued, or SQL statements do not include the schema name, all database objects are assumed to be under the APP schema.

Syntax

```
ij.user=username
```

Example

```
java -Dij.user=me -Dij.password=mine org.apache.derby.tools.ij
ij version 10.5
ij> connect 'jdbc:derby:sampleDB';
ij> set schema finance;
ij> select * from accounts;
```

See the *Java DB Developer's Guide* for more information on Derby and security.

derby.ui.codeset property

Function

Set this property to a supported character encoding value when using one of the Derby tools with a language not supported by your default system.

Syntax

```
derby.ui.codeset=derbyval
```

where *derbyval* is a supported character encoding value, for example, UTF8 (see Sample Character Encodings).

Example

The following command specifies to run `ij` using the Japanese territory (*derby.ui.locale=ja_JP*) using Japanese Latin Kanji mixed encoding (*codeset=Cp939*):

```
java -Dderby.ui.locale=ja_JP -Dderby.ui.codeset=Cp939
    -Dij.protocol=jdbc:derby:
    org.apache.derby.tools.ij
```

The following table contains a sampling of character encodings. Supported encodings vary from product to product. For example, to see the full list of the character encodings that are supported by Java 2 Software Development Kit, Standard Edition, v. 1.4.2 go to http://java.sun.com/j2se/1.4.2/docs/guide/intl/encoding.doc.html.

Table 2. Sample Character Encodings

Character Encoding	Explanation
8859_1	ISO Latin-1
8859_2	ISO Latin-2
8859_7	ISO Latin/Greek
Cp1257	Windows Baltic
Cp1258	Windows Vietnamese
Cp437	PC Original
EUCJIS	Japanese EUC
GB2312	GB2312-80 Simplified Chinese
JIS	JIS
KSC5601	KSC5601 Korean
MacCroatian	Macintosh Croatian
MacCyrillic	Macintosh Cyrillic
SJIS	PC and Windows Japanese
UTF8	Standard UTF-8

ij commands and errors reference

This section describes the commands and errors within the ij tool.

ij commands

`ij` accepts several commands to control its use of JDBC. It recognizes a semicolon as the end of an `ij` or SQL command; it treats semicolons within SQL comments, strings, and delimited identifiers as part of those constructs, not as the end of the command. Semicolons are required at the end of an `ij` or SQL statement.

All `ij` commands, identifiers, and keywords are case-insensitive.

Commands can span multiple lines without any special escaping for the ends of lines. This means that if a string spans a line, the new lines will show up in the value in the string.

`ij` treats any command that it does not recognize as an SQL command to be passed to the underlying connection, so syntactic errors in `ij` commands will cause them to be handed to the SQL engine and will probably result in SQL parsing errors.

Conventions for ij examples

Examples in this document show input from the keyboard or a file in bold text and console output from the DOS prompt or the `ij` application in regular text.

```
C:\> REM This example is from a DOS prompt:
C:\> java -Dij.protocol=jdbc:derby: org.apache.derby.tools.ij
ij version 10.5
ij> connect 'menuDB;create=true';
ij> CREATE TABLE menu(course CHAR(10), item CHAR(20), price INTEGER);
0 rows inserted/updated/deleted
ij> disconnect;
ij> exit;
C:\>
```

ij SQL command behavior

Any command other than those documented in the `ij` command reference are handed to the current connection to execute directly. The statement's closing semicolon, used by `ij` to determine that it has ended, is not passed to the underlying connection. Only one statement at a time is passed to the connection. If the underlying connection itself accepts semicolon-separated statements (which Derby does not), they can be passed to the connection using `ij`'s Execute command to pass in a command string containing semicolon-separated commands.

`ij` uses the result of the JDBC execute request to determine whether it should print a number-of-rows message or display a result set.

If a JDBC execute request causes an exception, it displays the *SQLState*, if any, and error message.

Setting the `ij` property *ij.showErrorCode* to *true* displays the *SQLException*'s error code (see ij properties reference).

The number-of-rows message for inserts, updates, and deletes conforms to the JDBC specification for any SQL statement that does not have a result set. DDL (data definition

language) commands typically report "0 rows inserted/updated/deleted" when they successfully complete.

To display a result set, `ij` formats a banner based on the JDBC *ResultSetMetaData* information returned from *getColumnLabel* and *getColumnWidth*. Long columns wrap the screen width, using multiple lines. An *&* character denotes truncation (`ij` limits displayed width of a column to 128 characters by default; see MaximumDisplayWidth command).

`ij` displays rows as it fetches them. If the underlying DBMS materializes rows only as they are requested, ij displays a partial result followed by an error message if there is a error in fetching a row partway through the result set.

`ij` verifies that a connection exists before issuing statements against it and does not execute SQL when no connection has yet been made.

There is no support in `ij` for the JDBC feature multiple result sets.

ij command example

```
ij> INSERT INTO menu VALUES ('appetizer','baby greens',7),
('entree','lamb chops ',6),('dessert','creme brulee',14);
3 rows inserted/updated/deleted
ij> SELECT * FROM menu;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
entree    |lamb chop            |14
dessert   |creme brulee         |6
appetizer |baby greens          |7

3 rows selected
ij>
```

Absolute command

Syntax

```
ABSOLUTE int Identifier
```

Description

Moves the cursor to the row specified by the *int*, then fetches the row. The cursor must have been created with the Get Scroll Insensitive Cursor command. It displays a banner and the values of the row.

Example

```
ij> autocommit off;
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> absolute 3 scrollCursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
entree    |lamb chop            |14
```

After Last command

Syntax

```
AFTER LAST Identifier
```

Description

Moves the cursor to after the last row, then fetches the row. (Since there is no current row, it returns the message: `"No current row."`

The cursor must have been created with the Get Scroll Insensitive Cursor command.

Example

```
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> after last scrollcursor;
No current row
```

Async command

Syntax

```
ASYNC IdentifierString
```

Description

The ASYNC command lets you execute an SQL statement in a separate thread. It is used in conjunction with the Wait For command to get the results.

You supply the SQL statement, which is any valid SQL statement, as a *String*. The *Identifier* you must supply for the async SQL statement is used in the Wait For command and is a case-insensitive `ij` identifier; it must not be the same as any other identifier for an async statement on the current connection. You cannot reference a statement previously prepared and named by the `ij`Prepare command in this command.

`ij` creates a new thread in the current connection to issue the SQL statement. The separate thread is closed once the statement completes.

Example

```
ij>async aInsert 'INSERT into menu values (''entree'',''chicken'',11)';
ij>INSERT INTO menu VALUES ('dessert','ice cream',3);
1 rows inserted/updated/deleted.
ij>wait for aInsert;
1 rows inserted/updated/deleted.
-- the result of the asynchronous insert
```

Autocommit command

Syntax

```
AUTOCOMMIT { ON | OFF }
```

Description

Turns the connection's auto-commit mode on or off. JDBC specifies that the default auto-commit mode is `ON`. Certain types of processing require that auto-commit mode be `OFF`. For information about auto-commit, see the *Java DB Developer's Guide*.

If auto-commit mode is changed from off to on when there is a transaction outstanding, that work is committed when the current transaction commits, not at the time auto-commit is turned on. Use Commit or Rollback before turning on auto-commit when there is a transaction outstanding, so that all prior work is completed before the return to auto-commit mode.

Example

```
ij> autocommit off;
ij> DROP TABLE menu;
0 rows inserted/updated/deleted
ij> CREATE TABLE menu (course CHAR(10), item CHAR(20), price INT);
0 rows inserted/updated/deleted
```

```
ij> INSERT INTO menu VALUES ('entree', 'lamb chop', 14),
('dessert', 'creme brulee', 6),
('appetizer', 'baby greens', 7);
3 rows inserted/updated/deleted
ij> commit;
ij> autocommit on;
ij>
```

Before First command

Syntax

```
BEFORE FIRST int Identifier
```

Description

Moves the cursor to before the first row, then fetches the row. (Since there is no current row, it returns the message `No current row`.)

The cursor must have been created with the Get Scroll Insensitive Cursor command.

Example

```
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> before first scrollcursor;
No current row
```

Close command

Syntax

```
CLOSE Identifier
```

Description

Closes the named cursor. The cursor must have previously been successfully created with the `ij`Get Cursor or Get Scroll Insensitive Cursor commands.

Example

```
ij> get cursor menuCursor as 'SELECT * FROM menu';
ij> next menuCursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij> next menuCursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij> close menuCursor;
ij>
```

Commit command

Syntax

```
COMMIT
```

Description

Issues a *java.sql.Connection.commit* request. Use this command only if auto-commit is off. A *java.sql.Connection.commit* request commits the currently active transaction and initiates a new transaction.

Example

```
ij> commit;
ij>
```

Connect command

Syntax

```
CONNECT ConnectionURLString [ PROTOCOL Identifier ]
    [ AS Identifier ] [ USER String
     PASSWORD String ]
```

Description

Connects to the database indicated by the *ConnectionURLString*. Specifically, takes the value of the string (the database connection URL) and issues a `getConnection` request using `java.sql.DriverManager` or a `javax.sql.DataSource` implementation (see the ij.dataSource property) to set the current connection to that database connection URL.

You have the option of specifying a name for your connection. Use the Set Connection command to switch between connections. If you do not name a connection, the system generates a name automatically.

You also have the option of specifying a named protocol previously created with the Protocol command or the ij.protocol.protocolName property.

If the connection requires a user name and password, supply those with the optional user and password parameters.

If the connect succeeds, the connection becomes the current one and ij displays a new prompt for the next command to be entered. If you have more than one open connection, the name of the connection appears in the prompt.

All further commands are processed against the new, current connection.

Example

```
ij> connect 'jdbc:derby:menuDB;create=true';
ij> -- we create a new table in menuDB:
CREATE TABLE menu(course CHAR(10), item CHAR(20), price INTEGER);
ij> protocol 'jdbc:derby:';
ij> connect 'sample' as sample1;
ij(SAMPLE1)> connect 'newDB;create=true' as newDB;
ij(NEWDB)> show connections;
CONNECTION0 - jdbc:derby:menuDB
NEWDB* - jdbc:derby:anotherDB
SAMPLE1 - jdbc:derby:newDB
ij>
ij> connect 'jdbc:derby:sample' user 'sa' password 'cloud3x9';
ij>
```

Describe command

Syntax

```
DESCRIBE { table-Name | view-Name }
```

Description

Provides a decription of the specified table or view. For a list of tables in the current schema, use the Show Tables command. For a list of views in the current schema, use

the Show Views command. For a list of available schemas, use the Show Schemas command.

If the table or view is in a particular schema, qualify it with the schema name. If the table or view name is case-sensitive, enclose it in single quotes. You can display all the columns from all the tables and views in a single schema in a single display by using the wildcard character '*'. See the examples below.

Examples

```
ij> describe airlines;
COLUMN_NAME
 |TYPE_NAME|DEC&|NUM&|COLUM&|COLUMN_DEF|CHAR_OCTE&|IS_NULL&
------------------------------------------------------------------------
-----
AIRLINE             |CHAR     |NULL|NULL|2     |NULL      |4         |NO
AIRLINE_FULL        |VARCHAR  |NULL|NULL|24    |NULL      |48        |YES
BASIC_RATE          |DOUBLE   |NULL|2   |52    |NULL      |NULL      |YES
DISTANCE_DISCOUNT   |DOUBLE   |NULL|2   |52    |NULL      |NULL      |YES
BUSINESS_LEVEL_FACT&|DOUBLE   |NULL|2   |52    |NULL      |NULL      |YES
FIRSTCLASS_LEVEL_FA&|DOUBLE   |NULL|2   |52    |NULL      |NULL      |YES
ECONOMY_SEATS       |INTEGER  |0   |10  |10    |NULL      |NULL      |YES
BUSINESS_SEATS      |INTEGER  |0   |10  |10    |NULL      |NULL      |YES
FIRSTCLASS_SEATS    |INTEGER  |0   |10  |10    |NULL      |NULL      |YES
```

```
    -- describe a table in another schema:
    describe user2.flights;
    -- describe a table whose name is in mixed-case:
    describe 'EmployeeTable';
    -- describe a table in a different schema, with a case-sensitive
 name:
    describe 'MyUser.Orders';
    -- describe all the columns from all the tables and views in APP
 schema:
    describe 'APP.*';
    -- describe all the columns in the current schema:
    describe '*';
```

Disconnect command

Syntax

```
DISCONNECT [ ALL | CURRENT | ConnectionIdentifier ]
```

Description

Disconnects from the database. Specifically issues a `java.sql.Connection.close` request against the connection indicated on the command line. There must be a current connection at the time the request is made.

If ALL is specified, all known connections are closed and there will be no current connection.

Disconnect CURRENT is the same as Disconnect without indicating a connection, the default connection is closed.

If a connection name is specified with an identifier, the command disconnects the named connection. The name must be the name of a connection in the current session provided with the ij.connection.connectionName property or with the Connect command.

If the ij.database property or the Connect command without the AS clause was used, you can supply the name the system generated for the connection. If the current connection is the named connection, when the command completes, there will be no current connection and you must issue a Set Connection or Connect command.

A Disconnect command issued against a Derby connection does not shut down the database or Derby (but the Exit command does).

Example

```
ij> connect 'jdbc:derby:menuDB;create=true';
ij> -- we create a new table in menuDB:
CREATE TABLE menu(course CHAR(10), ITEM char(20), PRICE integer);
0 rows inserted/updated/deleted
ij> disconnect;

ij> protocol 'jdbc:derby:';
ij> connect 'sample' as sample1;
ij> connect 'newDB;create=true' as newDB;
SAMPLE1 -    jdbc:derby:sample
NEWDB* -    jdbc:derby:newDB;create=true
* = current connection
ij(NEWDB)> set connection sample1;
ij> disconnect sample1;
ij> disconnect all;
ij>
```

Driver command

Syntax

```
DRIVER DriverNameString
```

Description

Takes the value of the *DriverNameString* and issues a *Class.forName* request to load the named class. The class is expected to be a JDBC driver that registers itself with *java.sql.DriverManager*.

If the Driver command succeeds, a new `ij` prompt appears for the next command.

Example

```
ij> -- load the Derby driver so that a connection
-- can be made:
driver 'org.apache.derby.jdbc.EmbeddedDriver';
ij> connect 'jdbc:derby:menuDB;create=true';
ij>
```

Elapsedtime command

Syntax

```
ELAPSEDTIME { ON | OFF }
```

Description

When `elapsedtime` is turned on, `ij` displays the total time elapsed during statement execution. The default value is OFF.

Example

```
ij> elapsedtime on;
ij> VALUES current_date;
1
----------
1998-07-15
ELAPSED TIME = 2134 milliseconds
ij>
```

Execute command

Syntax

```
EXECUTE { SQLString | PreparedStatementIdentifier }
[ USING { String | Identifier } ]
```

Description

Has several uses:

- To execute an SQL command entered as *SQLString*, using the Execute*String* style. The String is passed to the connection without further examination or processing by `ij`. *Normally, you execute SQL commands directly, not with the Execute command*.
- To execute a named command identified by *PreparedStatementIdentifier*. This must be previously prepared with the `ij`Prepare command.
- To execute either flavor of command when that command contains dynamic parameters, specify the values in the Using portion of the command. In this style, the *SQLString* or previously prepared *PreparedStatementIdentifier* is executed using the values supplied as *String* or *Identifier*. The *Identifier* in the USING clause must have a result set as its result. Each row of the result set is applied to the input parameters of the command to be executed, so the number of columns in the Using's result set must match the number of input parameters in the Execute's statement. The results of each execution of the Execute statement are displayed as they are made. If the Using's result set contains no rows, the Execute's statement is not executed.

  When auto-commit mode is on, the Using's result set is closed upon the first execution of the Execute statement. To ensure multiple-row execution of the Execute command, use the Autocommit command to turn auto-commit off.

Example

```
ij> autocommit off;
ij> prepare menuInsert as 'INSERT INTO menu VALUES (?, ?, ?)';
ij> execute menuInsert using 'VALUES
    (''entree'', ''lamb chop'', 14),
    (''dessert'', ''creme brulee'', 6)';
1 row inserted/updated/deleted
1 row inserted/updated/deleted
ij> commit;
```

Exit command

Syntax

```
EXIT
```

Description

Causes the `ij` application to complete and processing to halt. Issuing this command from within a file started with the Run command or on the command line causes the outermost input loop to halt.

`ij` automatically shuts down a Derby database running in an embedded environment (issues a *Connect 'jdbc:derby:;shutdown=true'* request) on exit.

`ij` exits when the Exit command is entered or if given a command file on the Java invocation line, when the end of the command file is reached.

Example

```
ij> disconnect;
```

```
ij> exit;
C:\>
```

First command

Syntax

```
FIRST Identifier
```

Description

Moves the cursor to the first row in the *ResultSet*, then fetches the row. The cursor must have been created with the Get Scroll Insensitive Cursor command. It displays a banner and the values of the row.

Example

```
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> first scrollcursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
entree    |lamb chop            |14
```

Get Cursor command

Syntax

```
GET [WITH {HOLD|NOHOLD}] CURSOR Identifier AS String
```

WITH HOLD is the default attribute of the cursor. For a non-holdable cursor, use the WITH NOHOLD option.

Note: WITH NOHOLD is only available in Java 2 Platform, Standard Edition, v 1.4 (J2SE) or higher.

Description

Creates a cursor with the name of the *Identifier* by issuing a *java.sql.Statement.executeQuery* request on the value of the *String*.

If the *String* is a statement that does not generate a result set, the behavior of the underlying database determines whether an empty result set or an error is issued. If there is an error in executing the statement, no cursor is created.

`ij` sets the cursor name using a *java.sql.Statement.setCursorName* request. Behavior with respect to duplicate cursor names is controlled by the underlying database. Derby does not allow multiple open cursors with the same name.

Once a cursor has been created, the `ij`Next and Close commands can be used to step through its rows, and if the connection supports positioned update and delete commands, they can be issued to alter the rows.

Example

```
ij> -- autocommit needs to be off so that the positioned update
ij> -- can see the cursor it operates against.
ij> autocommit off;
ij> get cursor menuCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> next menuCursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
entree    |lamb chop            |14
```

```
ij> next menuCursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
dessert   |creme brulee         |6
ij> UPDATE menu SET price=price+1 WHERE CURRENT OF menuCursor;
1 row inserted/updated/deleted
ij> next menuCursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
appetizer |baby greens salad    |7
ij> close menuCursor;
ij> commit;
ij>
```

Get Scroll Insensitive Cursor command

Syntax

```
GET SCROLL INSENSITIVE [WITH {HOLD|NOHOLD}]
   CURSOR Identifier AS
   String
```

WITH HOLD is the default attribute of the cursor. For a non-holdable cursor, use the WITH NOHOLD option.

Note: WITH NOHOLD is only available in Java 2 Platform, Standard Edition, v 1.4 (J2SE) or higher.

Description

Creates a scrollable insensitive cursor with the name of the *Identifier*. (It does this by issuing a *createStatement(ResultSet.TYPE_SCROLL_INSENSITIVE, ResultSet.CONCUR_READ_ONLY*) call and then executing the statement with *java.sql.StatementExecuteQuery* request on the value of the String.)

If the *String* is a statement that does not generate a result set, the behavior of the underlying database determines whether an empty result set or an error is issued. If there is an error in executing the statement, no cursor is created.

ij sets the cursor name using a *java.sql.Statement.setCursorName* request. Behavior with respect to duplicate cursor names is controlled by the underlying database. Derby does not allow multiple open cursors with the same name.

Once a scrollable cursor has been created, you can use the follow commands to work with the result set:

- Absolute command
- After Last command
- Before First command
- Close command
- First command
- Last command
- Next command
- Previous command
- Relative command

Example

```
ij> autocommit off;
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu';
ij> absolute 5 scrollCursor;
COURSE    |ITEM                 |PRICE
-----------------------------------------------
entree    |lamb chop            |14
```

```
ij> after last scrollcursor;
No current row
ij> before first scrollcursor;
No current row
ij> first scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij> last scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij> previous scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij> relative 1 scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij>>previous scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij> next scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
```

Help command

Syntax

```
HELP
```

Description

Prints out a brief list of the `ij` commands.

Last command

Syntax

```
LAST Identifier
```

Description

Moves the cursor to the last row in the *ResultSet*, then fetches the row. The cursor must have been created with the Get Scroll Insensitive Cursor command. It displays a banner and the values of the row.

Example

```
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> absolute 5 scrollCursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij> last scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
```

LocalizedDisplay command

Syntax

```
LOCALIZEDDISPLAY { on | off }
```

Description

Specifies to display locale-sensitive data (such as dates) in the native format for the `ij` locale. The `ij` locale is the same as the Java system locale.

Note: NUMERIC and DECIMAL values are not localized when using the J2ME/CDC/Foundation Profile because of platform limitations.

Example

The following demonstrates *LocalizedDisplay* in an English locale:

```
ij> VALUES CURRENT_DATE;
1
----------
2000-05-01
1 row selected
ij> localizeddisplay on;
ij> VALUES CURRENT_DATE;
1
------------------
May 1, 2000
1 row selected
```

MaximumDisplayWidth command

Syntax

```
MAXIMUMDISPLAYWIDTH integer_value
```

Description

Sets the largest display width for columns to the specified value. This is generally used to increase the default value in order to display large blocks of text.

Example

```
ij> maximumdisplaywidth 3;
ij> VALUES 'NOW IS THE TIME!';
1
---
NOW
ij> maximumdisplaywidth 30;
ij> VALUES 'NOW IS THE TIME!';
1
----------------
NOW IS THE TIME!
```

Next command

Syntax

```
NEXT Identifier
```

Description

Fetches the next row from the named cursor created with the Get Cursor command or Get Scroll Insensitive Cursor. It displays a banner and the values of the row.

Example

```
ij> get cursor menuCursor as 'SELECT * FROM menu';
ij> next menuCursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij>
```

Prepare command

Syntax

```
PREPARE Identifier AS String
```

Description

Creates a *java.sql.PreparedStatement* using the value of the String, accessible in `ij` by the *Identifier* given to it. If a prepared statement with that name already exists in `ij`, an error will be returned and the previous prepared statement will remain. Use the Remove command to remove the previous statement first. If there are any errors in preparing the statement, no prepared statement is created.

Any SQL statements allowed in the underlying connection's prepared statement can be prepared with this command.

Example

```
ij> prepare seeMenu as 'SELECT * FROM menu';
ij> execute seeMenu;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
dessert   |creme brulee        |6

2 rows selected
ij>
```

Previous command

Syntax

```
PREVIOUS Identifier
```

Description

Moves the cursor to the row previous to the current one, then fetches the row. The cursor must have been created with the Get Scroll Insensitive Cursor command. It displays a banner and the values of the row.

Example

```
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> last scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij> previous scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
```

Protocol command

Syntax

```
PROTOCOL String [ AS Identifier ]
```

Description

Specifies the protocol, as a String, for establishing connections and automatically loads the appropriate driver. *Protocol* is the part of the database connection URL syntax appropriate for your environment, including the JDBC protocol and the protocol specific to Derby. For further information about the Derby database connection URL, see the *Java DB Developer's Guide*. Only Derby protocols are supported. Those protocols are listed in ij.protocol property.

Providing a protocol allows you to use a shortened database connection URL for connections. You can provide only the database name instead of the full protocol. In addition, you do not need to use the Driver command or specify a driver at start-up, since the driver is loaded automatically.

If you name the protocol, you can refer to the protocol name in the Connect command.

Example

```
ij> protocol 'jdbc:derby:';
ij> connect 'sample';
```

Readonly command

Syntax

```
READONLY { ON | OFF }
```

Description

Sets the current connection to a "read-only" connection, as if the current user were defined as a *readOnlyAccess* user. (For more information about database authorization, see the *Java DB Developer's Guide*.)

Example

```
ij> connect 'jdbc:derby:menuDB';
ij> readonly on;
ij> SELECT * FROM menu;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
dessert   |creme brulee        |6
appetizer |baby greens         |7
entree    |lamb chop           |14
entree    |lamb chop           |14
dessert   |creme brulee        |6
6 rows selected
ij> UPDATE menu set price = 3;
ERROR 25502: An SQL data change is not permitted for a read-only
connection, user or database.
```

Relative command

Syntax

```
RELATIVE int Identifier
```

Description

Moves the cursor to the row that is *int* number of rows relative to the current row, then fetches the row. The cursor must have been created with the Get Scroll Insensitive Cursor command. It displays a banner and the values of the row.

Example

```
ij> -- autocommit needs to be off so that the positioned update
ij> -- can see the cursor it operates against.
ij> autocommit off;
ij> get scroll insensitive cursor scrollCursor as
'SELECT * FROM menu FOR UPDATE OF price';
ij> last scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
ij> previous scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
ij> relative 1 scrollcursor;
COURSE    |ITEM                |PRICE
-----------------------------------------------
dessert   |creme brulee        |6
```

Remove command

Syntax

```
REMOVE Identifier
```

Description

Removes a previously prepared statement from ij. The identifier is the name by which the statement was prepared. The statement is closed to release its database resources.

Example

```
ij> prepare seeMenu as 'SELECT * FROM menu';
ij> execute seeMenu;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
dessert   |creme brulee        |6

2 rows selected
ij> remove seeMenu;
ij> execute seeMenu;
IJ ERROR: Unable to establish prepared statement SEEMENU
ij>
```

Rollback command

Syntax

```
ROLLBACK
```

Description

Issues a *java.sql.Connection.rollback* request. Use only if auto-commit is off. A *java.sql.Connection.rollback* request undoes the currently active transaction and initiates a new transaction.

Example

```
ij> autocommit off;
ij> INSERT INTO menu VALUES ('dessert', 'rhubarb pie', 4);
1 row inserted/updated/deleted
ij> SELECT * from menu;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
dessert   |creme brulee        |7
appetizer |baby greens         |7
dessert   |rhubarb pie         |4

4 rows selected
ij> rollback;
ij> SELECT * FROM menu;
COURSE    |ITEM                |PRICE
-----------------------------------------------
entree    |lamb chop           |14
dessert   |creme brulee        |7
appetizer |baby greens         |7

3 rows selected
ij>
```

Run command

Syntax

```
RUN String
```

Description

Assumes that the value of the string is a valid file name, and redirects `ij` processing to read from that file until it ends or an Exit command is executed. If the end of the file is reached without `ij` exiting, reading will continue from the previous input source once the end of the file is reached. Files can contain Run commands.

`ij` prints out the statements in the file as it executes them.

Any changes made to the `ij` environment by the file are visible in the environment when processing resumes.

Example

```
ij> run 'setupMenuConn.ij';
ij> -- this is setupMenuConn.ij
-- ij displays its contents as it processes file
ij> connect 'jdbc:derby:menuDB';
ij> autocommit off;
ij> -- this is the end of setupMenuConn.ij
-- there is now a connection to menuDB and no autocommit.
-- input will now resume from the previous source.
;
ij>
```

Set Connection command

Syntax

```
SET CONNECTION Identifier
```

Description

Allows you to specify which connection to make current when you have more than one connection open. Use the Show Connections command to display open connections.

If there is no such connection, an error results and the current connection is unchanged.

Example

```
ij> protocol 'jdbc:derby:';
ij> connect 'sample' as sample1;
ij> connect 'newDB;create=true' as newDB;
ij (NEWDB)> show connections;
SAMPLE1 -    jdbc:derby:sample
NEWDB* -    jdbc:derby:newDB;create=true
* = current connection
ij(NEWDB)> set connection sample1;
ij(SAMPLE1)> disconnect all;
ij>
```

Show command

Syntax

```
SHOW
{
   CONNECTIONS |
   INDEXES [ IN schemaName | FROM table-Name ] |
   PROCEDURES [ IN schemaName ] |
   ROLES |
   ENABLED_ROLES |
   SETTABLE_ROLES |
   SCHEMAS |
   SYNONYMS [ IN schemaName ] |
   TABLES [ IN schemaName ] |
   VIEWS [ IN schemaName ] |

}
```

Description

The SHOW command can be used to display information about active connections and database objects.

SHOW CONNECTIONS

If there are no connections, the SHOW CONNECTIONS command returns "No connections available".

Otherwise, the command displays a list of connection names and the URLs used to connect to them. The currently active connection, if there is one, is marked with an * after its name.

Example

```
ij> connect 'sample' as sample1;
ij> connect 'newDB;create=true' as newDB;
ij(NEWDB)> show connections;
SAMPLE1 -        jdbc:derby:sample
NEWDB* -        jdbc:derby:newDB;create=true
* = current connection
ij(NEWDB)>
```

SHOW INDEXES

SHOW INDEXES displays all the indexes in the database.

If **IN *schemaName*** is specified, then only the indexes in the specified schema are displayed.

If **FROM *table-Name*** is specified, then only the indexes on the specified table are displayed.

Example

```
ij> show indexes in app;
TABLE_NAME          |COLUMN_NAME         |NON_U&|TYPE|ASC&|CARDINA&|PAGES
----------------------------------------------------------------------------
---
AIRLINES            |AIRLINE             |false |3   |A   |NULL    |NULL
COUNTRIES           |COUNTRY_ISO_CODE    |false |3   |A   |NULL    |NULL
COUNTRIES           |COUNTRY             |false |3   |A   |NULL    |NULL
CITIES              |CITY_ID             |false |3   |A   |NULL    |NULL
FLIGHTS             |FLIGHT_ID           |false |3   |A   |NULL    |NULL
FLIGHTS             |SEGMENT_NUMBER      |false |3   |A   |NULL    |NULL
FLIGHTAVAILABILITY  |FLIGHT_ID           |false |3   |A   |NULL    |NULL
FLIGHTAVAILABILITY  |SEGMENT_NUMBER      |false |3   |A   |NULL    |NULL
FLIGHTAVAILABILITY  |FLIGHT_DATE         |false |3   |A   |NULL    |NULL
MAPS                |MAP_ID              |false |3   |A   |NULL    |NULL
MAPS                |MAP_NAME            |false |3   |A   |NULL    |NULL
FLIGHTS             |DEST_AIRPORT        |true  |3   |A   |NULL    |NULL
FLIGHTS             |ORIG_AIRPORT        |true  |3   |A   |NULL    |NULL
CITIES              |COUNTRY_ISO_CODE    |true  |3   |A   |NULL    |NULL
FLIGHTAVAILABILITY  |FLIGHT_ID           |true  |3   |A   |NULL    |NULL
FLIGHTAVAILABILITY  |SEGMENT_NUMBER      |true  |3   |A   |NULL    |NULL

16 rows selected
ij> show indexes from flights;
TABLE_NAME          |COLUMN_NAME         |NON_U&|TYPE|ASC&|CARDINA&|PAGES
----------------------------------------------------------------------------
---
FLIGHTS             |FLIGHT_ID           |false |3   |A   |NULL    |NULL
FLIGHTS             |SEGMENT_NUMBER      |false |3   |A   |NULL    |NULL
FLIGHTS             |DEST_AIRPORT        |true  |3   |A   |NULL    |NULL
FLIGHTS             |ORIG_AIRPORT        |true  |3   |A   |NULL    |NULL

4 rows selected
```

SHOW PROCEDURES

SHOW PROCEDURES displays all the procedures in the database that have been created with the CREATE PROCEDURE statement, as well as system procedures.

If **`IN`** ***`schemaName`*** is specified, only procedures in the specified schema are displayed.

Example

```
ij> show procedures in syscs_util;
PROCEDURE_SCHEM     |PROCEDURE_NAME                  |REMARKS
------------------------------------------------------------------------
SYSCS_UTIL          |SYSCS_BACKUP_DATABASE           |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_BACKUP_DATABASE_AND_ENA&|org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_BACKUP_DATABASE_AND_ENA&|org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_BACKUP_DATABASE_NOWAIT    |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_BULK_INSERT               |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_CHECKPOINT_DATABASE       |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_COMPRESS_TABLE            |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_DISABLE_LOG_ARCHIVE_MODE|org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_EXPORT_QUERY              |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_EXPORT_TABLE              |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_FREEZE_DATABASE           |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_IMPORT_DATA               |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_IMPORT_TABLE              |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_INPLACE_COMPRESS_TABLE    |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_SET_DATABASE_PROPERTY     |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_SET_RUNTIMESTATISTICS     |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_SET_STATISTICS_TIMING     |org.apache.derby.ca&
SYSCS_UTIL          |SYSCS_UNFREEZE_DATABASE         |org.apache.derby.ca&

18 rows selected
```

SHOW ROLES, SHOW ENABLED_ROLES, SHOW SETTABLE_ROLES

SHOW ROLES displays the names of all roles created, whether settable for the current session or not.

SHOW ENABLED_ROLES displays the names of all the roles whose privileges are available for the current session. That is, it shows the current role and any role contained in the current role. (For a definition of role containment, see "Using SQL roles" in the *Java DB Developer's Guide*.)

SHOW SETTABLE_ROLES displays all the roles that the current session can set, that is, all roles that have been granted to the current user or to PUBLIC.

The roles shown by these commands are sorted in ascending order.

Example

```
ij> show roles;
ROLEID
------------------------------
ANYUSER
CASUALUSER
POWERUSER

3 rows selected
ij> show enabled_roles;
ROLEID
------------------------------
ANYUSER
CASUALUSER

2 rows selected
ij> show settable_roles;
ROLEID
------------------------------
CASUALUSER
POWERUSER

2 rows selected
```

In the examples above, both CASUALUSER and POWERUSER contain ANYUSER, but ANYUSER is not settable directly.

SHOW SCHEMAS

SHOW SCHEMAS displays all of the schemas in the current connection.

Example

```
ij> show schemas;
TABLE_SCHEM
------------------------------
APP
NULLID
SQLJ
SYS
SYSCAT
SYSCS_DIAG
SYSCS_UTIL
SYSFUN
SYSIBM
SYSPROC
SYSSTAT

11 rows selected
```

SHOW SYNONYMS

SHOW SYNONYMS displays all the synonyms in the database that have been created with the CREATE SYNONYMS statement.

If **`IN`** ***`schemaName`*** is specified, only synonyms in the specified schema are displayed.

Example

```
ij> show synonyms;
TABLE_SCHEM         |TABLE_NAME                    |REMARKS
------------------------------------------------------------------------
APP                 |MYAIRLINES                    |
```

SHOW TABLES

SHOW TABLES displays all of the tables in the current schema.

If **IN** ***schemaName*** is specified, the tables in the given schema are displayed.

Example

```
ij> show tables;
TABLE_SCHEM         |TABLE_NAME                    |REMARKS
------------------------------------------------------------------------
APP                 |AIRLINES                      |
APP                 |CITIES                        |
APP                 |COUNTRIES                     |
APP                 |FLIGHTAVAILABILITY            |
APP                 |FLIGHTS                       |
APP                 |FLIGHTS_HISTORY               |
APP                 |MAPS                          |

7 rows selected
```

SHOW VIEWS

SHOW VIEWS displays all of the views in the current schema.

If **IN** ***schemaName*** is specified, the views in the given schema are displayed.

Example

```
ij> show views;
TABLE_SCHEM         |TABLE_NAME                    |REMARKS
------------------------------------------------------------------------
APP                 |TOTALSEATS                    |

1 row selected
```

Wait For command

Syntax

```
WAIT FOR Identifier
```

Description

Displays the results of a previously started asynchronous command.

The identifier for the asynchronous command must have been used in a previous Async command on this connection. The Wait For command waits for the SQL statement to complete execution, if it has not already, and then displays the results. If the statement returns a result set, the Wait For command steps through the rows, not the Async command. This might result in further execution time passing during the result display.

Example

See Async command.

Syntax for comments in ij commands

Syntax

```
-- Text
```

```
/* Text */
```

Description

You can use a double dash to create a comment anywhere within an `ij` command line and as permitted by the underlying connection within SQL commands. The comment is ended at the first new line encountered in the text.

Comments are ignored on input and have no effect on the output displayed.

You can also enclose text in `/* */` characters to create either one-line or multi-line comments. Nested comments are permitted. For example, you could put lines like the following into a script named `comment.sql`:

```
/* start the file with a /* nested comment */ and see what happens */
connect 'jdbc:derby:newdb;create=true';
values 'hi!';
create table t (x int);
/* use a multi-line comment */
/*
insert into t values 1, 2, 3;
insert into t values 4, 5, 6;
*/
/* end the file with a comment */
values 'This is a test';
/* This is also a test */
```

Examples

```
ij> -- this is a comment;
-- the semicolons in the comment are not taken as the end
-- of the command; for that, we put it outside the --:
;
ij>
```

```
ij> run 'comment.sql';
ij> /* start the file with a /* nested comment */ and see what happens */
connect 'jdbc:derby:newdb;create=true';
ij> values 'hi!';
1
---
hi!

1 row selected
ij> create table t (x int);
0 rows inserted/updated/deleted
ij> /* use a multi-line comment */
/*
insert into t values 1, 2, 3;
insert into t values 4, 5, 6;
*/
/* end the file with a comment */
values 'This is a test';
1
--------------
This is a test

1 row selected
ij> /* This is also a test */
;
ij>
```

Syntax for identifiers in ij commands

Syntax

```
Identifier
```

Description

Some ij commands require identifiers. These ij identifiers are case-insensitive. They must begin with a letter in the range A-Z, and can consist of any number of letters in the range A-Z, digits in the range 0-9, and underscore (_) characters.

These identifiers exist within the scope of ij only and are distinct from any identifiers used in SQL commands, except in the case of the Get Cursor command. The Get Cursor command specifies a cursor name to use in creating a result set.

ij does not recognize or permit delimited identifiers in ij commands. They can be used in SQL commands.

Example

```
These are valid ij identifiers:
foo1
exampleIdentifier12345
another_one
```

Syntax for strings in ij commands

Syntax

```
'Text'
```

Description

Some ij commands require strings. ij strings are represented by the same literal format as SQL strings and are delimited by single quotation marks. To include a single quotation mark in a string, you must use two single quotation marks, as shown in the examples below. ij places no limitation on the lengths of strings, and will treat embedded new lines in the string as characters in the string.

Some ij commands execute SQL commands specified as strings. Therefore, you must double any single quotation marks within such strings, as shown in the second example below.

The cases of letters within a string are preserved.

Example

```
This is a string in ij     And this is its value
'Mary''s umbrella'          Mary's umbrella
'hello world'               hello world

--returns Joe's
execute 'VALUES ''Joe''''s''';
```

ij errors

ij might issue messages to inform the user of errors during processing of statements.

ERROR SQLState

When the underlying JDBC driver returns an *SQLException*, ij displays the *SQLException* message with the prefix "ERROR SQLState". If the *SQLException* has no SQLState associated with it, the prefix "ERROR (no SQLState)" is used.

WARNING SQLState

Upon completion of execution of any JDBC request, `ij` will issue a *getWarnings* request and display the SQLWarnings that are returned. Each *SQLWarning* message is displayed with the prefix "WARNING *SQLState*". If an *SQLWarning* has no SQLState associated with it, the prefix "WARNING (no SQLState)" is used.

IJ ERROR

When `ij` runs into errors processing user commands, such as being unable to open the file named in a Run command or not having a connection to disconnect from, it prints out a message with the prefix "IJ ERROR".

IJ WARNING

`ij` displays warning messages to let the user know if behavior might be unexpected. `ij` warnings are prefixed with "IJ WARNING".

JAVA ERROR

When an unexpected Java exception occurs, `ij` prints a message with the prefix "JAVA ERROR".

Using the bulk import and export procedures

You can import and export large amounts of data between files and the Derby database. Instead of having to use INSERT and SELECT statements, you can use Derby system procedures to import data directly from files into tables and to export data from tables into files.

The Derby system procedures import and export data in delimited data file format.

- Use the export system procedures to write data from a database to one or more files that are stored outside of the database. You can use a procedure to export data from a table into a file or export data from a SELECT statement result into a file.
- Use the import system procedures to import data from a file into a table. If the target table already contains data, you can replace or append to the existing data.

Methods for running the import and export procedures

You can run the import and export procedures from within an SQL statement using `ij` or any Java application.

The import and export procedures read and write text files, and if you use an external file when you import or export data, you can also import and export blob data. The import procedures do not support read-once streams (live data feeds), because the procedures read the first line of the file to determine the number of columns, then read the file again to import the data.

Note: The import and export procedures are server-side utilities that exhibit different behavior in client/server mode. Typically, you use these procedures to import data into and export data from a locally running Derby database. However, you can use the import and export procedures when Derby is running in a server framework if you specify import and export files that are accessible to the server.

Bulk import and export requirements and considerations

There are requirements and limitations that you must consider before you use the Derby import and export procedures.

Database transactions
: You should issue either a COMMIT or ROLLBACK statement to complete all transactions and release all table-level locks before you invoke an import or export procedure. Derby issues a COMMIT or a ROLLBACK statement after each import and export procedure is run.
: **Note:** Imports are transactional. If an error occurs during bulk import, all changes are rolled back.

Database connections
: To invoke a Derby import or export procedure, you must be connected to the database into which the data is imported or from which the data is exported. Other user applications that access the table with a separate connection do not need to disconnect.

Classpath
: You must have the `derbytools.jar` file in your classpath before you can use the import or export procedures from `ij`.

The table must exist

To import data into a table, the table must already exist in Derby. The table does not have to be empty. If the table is not empty, bulk import performs single row inserts which results in slower performance.

Create indexes, keys, and unique constraints before you import

To avoid a separate step, create the indexes, keys (primary and foreign), and unique constraints on tables before you import data. However, if your memory and disk spaces resources are limited, you can build the indexes and primary keys after importing data.

Data types

Derby implicitly converts the strings to the data type of the receiving column. If any of the implicit conversions fail, the whole import is aborted. For example, "3+7" cannot be converted into an integer. An export that encounters a runtime error stops.

Note: You cannot import or export the XML data type.

Locking during import

Import procedures use the same isolation level as the connection in which they are executed to insert data into tables. During import, the entire table is exclusively locked irrespective of the isolation level.

Locking during export

Export procedures use the same isolation level as the connection in which they are executed to fetch data from tables.

Import behavior on tables with triggers

The import procedures enables INSERT triggers when data is appended to the table. The REPLACE parameter is not allowed when triggers are enabled on the table.

Restrictions on the REPLACE parameter

If you import data into a table that already contains data, you can either replace or append to the existing data. You can use the REPLACE parameter on tables that have dependent tables. The replaced data must maintain referential integrity, otherwise the import operation will be rolled back. You cannot use the REPLACE parameter if the table has triggers enabled.

Restrictions on tables

You cannot use import procedures to import data into a system table or a declared temporary table.

Bulk import and export of large objects

You can import and export large objects (LOBs) using the Derby system procedures.

Importing and exporting CLOB and BLOB data

CLOB and BLOB can be exported to the same file as the rest of the column data, or the LOB column data can be exported to separate external file. When the LOB column data is exported to separate external file, reference to the location of the LOB data is placed in the LOB column in the main export file.

Importing and exporting LOB data using an separate external file might be faster than storing the LOB data in the same file as the rest of the column data:

- The CLOB data does not have to be scanned for the delimiters inside the data
- The BLOB data does not need to be converted into a hexadecimal format

Importing and exporting other binary data

When you export columns that contain the data types CHAR FOR BIT DATA, VARCHAR FOR BIT DATA, and LONG VARCHAR FOR BIT DATA, the column data is always exported to the main export file. The data is written in the hexadecimal format. To import data into a table that has columns of these data types, the data in the import file for those column must be in the hexadecimal format.

Importing LOB data from a file that contains all of the data

You can use the SYSCS_UTIL.SYSCS_IMPORT_TABLE and SYSCS_UTIL.SYSCS_IMPORT_DATA procedures to import data into a table that contains a LOB column. The LOB data must be stored in the same file as the other column data that you are importing. If you are importing data from a file that was exported from a non-Derby source, the binary data must be in the hexadecimal format.

Importing LOB data from a separate external file

You can use the SYSCS_UTIL.SYSCS_IMPORT_TABLE_LOBS_FROM_EXTFILE and SYSCS_UTIL.SYSCS_IMPORT_DATA_LOBS_FROM_EXTFILE procedures to import LOB data that is stored in a file that is separate from the main import file. These procedures read the LOB data using the reference that is stored in the main import file. If you are importing data from a non-Derby source, the references to the LOB data must be in the main import file in the format lobsFileName.Offset.length/. This is the same method that the Derby export procedures use to export the LOB data to a separate external file.

Exporting LOB data to the same file as the other column data

You can use the SYSCS_UTIL.SYSCS_EXPORT_TABLE and SYSCS_UTIL.SYSCS_EXPORT_QUERY procedures to write LOB data, along with rest of the column data, to a single export file.

CLOB column data is treated same as other character data. Character delimiters are allowed inside the CLOB data. The export procedures write the delimiter inside the data as a double-delimiter.

BLOB column data is written to the export file in the hexadecimal format. For each byte of BLOB data, two characters are generated. The first character represents the high nibble (4 bits) in hexadecimal and the second character represents the low nibble.

Exporting LOB data to a separate external file from the other column data

You can use the SYSCS_UTIL.SYSCS_EXPORT_TABLE_LOBS_TO_EXTFILE and SYSCS_UTIL.SYSCS_EXPORT_QUERY_LOBS_TO_EXTFILE procedures to write LOB data to a separate external file. These procedures include the lobFileName parameter, which specifies the name of external file for the LOB data.

When you use these procedures, the location of the LOB data is written to the main export file. The format of the reference to the LOB stored in the main export file is lobsFileName.Offset.length/.

- Offset is the position in the external file in bytes
- length is the size of the LOB column data in bytes

If a LOB column value is NULL, length is written as -1. No data conversion is performed when you export LOB data to an external file. BLOB data is written in binary format and CLOB data is written using the codeset that you specify.

See Examples of bulk import and export for examples using each of the import and export procedures.

File format for input and output

There are specific requirements for the format of the input and output files when you import and export data.

The default file format is a delimited text file with the following characteristics:

- Rows are separated by a new line
- Fields are separated by a comma (,)
- Character-based fields are delimited with double quotes (")

Restriction: Before you perform import or export operations, you must ensure that the chosen delimiter character is not contained in the data to be imported or exported. If you chose a delimiter character that is part of the data to be imported or exported unexpected errors might occur. The following restrictions apply to column and character delimiters:

- Delimiters are mutually exclusive
- A delimiter cannot be a line-feed character, a carriage return, or a blank space
- The default decimal point (.) cannot be a character delimiter
- Delimiters cannot be hex decimal characters (0-9, a-f, A-F).

The record delimiter is assumed to be a new-line character. The record delimiter should not be used as any other delimiter.

Character delimiters are permitted with the character-based fields (CHAR, VARCHAR, and LONG VARCHAR) of a file during import. Any pair of character delimiters found between the enclosing character delimiters is imported into the database. For example, suppose that you have the following character string:

```
"what a ""great"" day!"
```

The preceding character string gets imported into the database as:

```
What a "great" day!
```

During export, the rule applies in reverse. For example, suppose you have the following character string:

```
"The boot has a 3" heel."
```

The preceding character string gets exported to a file as:

```
"The boot has a 3""heel."
```

The following example file shows four rows and four columns in the default file format:

```
1,abc,22,def
22,,,"a is a zero-length string, b is null"
13,"hello",454,"world"
4,b and c are both null,,
```

The export procedure outputs the following values:

```
1,"abc",22,"def"
22,,,"a is a zero-length string, b is null"
13,"hello",454,"world"
4,"b and c are both null",,
```

Importing data using the built-in procedures

You can use the Derby import procedures to import all of the data from table or query, or to import LOB data separately from the other data.

1. Choose the correct procedure for the type of import that you want to perform. For examples of these procedures, see Examples of bulk import and export.

Type of import	Procedure to use
To import all the data to a table, where the import file contains the LOB data	`SYSCS_UTIL.SYSCS_IMPORT_TABLE (IN SCHEMANAME VARCHAR(128), IN TABLENAME VARCHAR(128), IN FILENAME VARCHAR(32672), IN COLUMNDELIMITER CHAR(1), IN CHARACTERDELIMITER CHAR(1), IN CODESET VARCHAR(128),`

	`IN REPLACE SMALLINT)`
To import the data to a table, where the LOB data is stored in a separate file and the main import file contains all of the other data with a reference to the LOB data	`SYSCS_UTIL.SYSCS_IMPORT_TABLE_LOBS_FROM_EXTFILE` `(IN SCHEMANAME VARCHAR(128),` `IN TABLENAME VARCHAR(128),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128),` `IN REPLACE SMALLINT)` The import utility looks in the main import file for a reference to the location of the LOB data. The format of the reference to the LOB stored in the main import file must be `lobsFileName.Offset.length/`.
To import data from a file to a subset of columns in a table, where the import file contains the LOB data	`SYSCS_UTIL.SYSCS_IMPORT_DATA` `(IN SCHEMANAME VARCHAR(128),` `IN TABLENAME VARCHAR(128),` `IN INSERTCOLUMNS VARCHAR(32672),` `IN COLUMNINDEXES VARCHAR(32672),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128),` `IN REPLACE SMALLINT)` You must specify the insertColumns parameter on the table into which data will be imported. You must specify the columnIndex parameter to import data fields from a file to column in a table.
To import data to a subset of columns in a table, where the LOB data is stored in a separate file and the main import file contains all of the other data with a reference to the LOB data	`SYSCS_UTIL.SYSCS_IMPORT_DATA_LOBS_FROM_EXTFILE` `(IN SCHEMANAME VARCHAR(128),` `IN TABLENAME VARCHAR(128),` `IN INSERTCOLUMNS VARCHAR(32672),` `IN COLUMNINDEXES VARCHAR(32672),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128),` `IN REPLACE SMALLINT)` The import utility looks in the main import file for a reference to the location of the LOB data. The format of the reference to the LOB stored in the main import file must be `lobsFileName.Offset.length/`.

Parameters for the import procedures

The Derby import procedures use specific parameters.

SCHEMANAME
: Specifies the schema of the table. You can specify a NULL value to use the default schema name. The SCHEMANAME parameter takes an input argument that is a VARCHAR (128) data type.

TABLENAME
: Specifies the name of the table into which the data is to be imported. This table cannot be a system table or a declared temporary table. The string must exactly match case of the table name. Specifying a NULL value results in an error. The TABLENAME parameter takes an input argument that is a VARCHAR (128) data type.

INSERTCOLUMNS

Specifies the comma separated column names of the table into which the data will be imported. You can specify a NULL value to import into all columns of the table. The INSERTCOLUMNS parameter takes an input argument that is a VARCHAR (32672) data type.

COLUMNINDEXES

Specifies the comma separated column indexes (numbered from one) of the input data fields that will be imported. You can specify a NULL value to use all input data fields in the file. The COLUMNINDEXES parameter takes an input argument that is a VARCHAR (32762) data type.

FILENAME

Specifies the name of the file that contains the data to be imported. If the path is omitted, the current working directory is used. The specified location of the file should refer to the server side location if using the Network Server. Specifying a NULL value results in an error. The FILENAME parameter takes an input argument that is a VARCHAR (32672) data type.

COLUMNDELIMITER

Specifies a column delimiter. The specified character is used in place of a comma to signify the end of a column. You can specify a NULL value to use the default value of a comma. The COLUMNDELIMITER parameter takes an input argument that is a CHAR (1) data type.

CHARACTERDELIMITER

Specifies a character delimiter. The specified character is used in place of double quotation marks to enclose a character string. You can specify a NULL value to use the default value of a double quotation mark. The CHARACTERDELIMITER parameter takes an input argument that is a CHAR (1) data type.

CODESET

Specifies the code set of the data in the input file. The code set name should be one of the Java-supported character encoding sets. Data is converted from the specified code set to the database code set (UTF-8). You can specify a NULL value to interpret the data file in the same code set as the JVM in which it is being executed. The CODESET parameter takes an input argument that is a VARCHAR (128) data type.

REPLACE

A non-zero value for the replace parameter will import in REPLACE mode, while a zero value will import in INSERT mode. REPLACE mode deletes all existing data from the table by truncating the table and inserts the imported data. The table definition and the index definitions are not changed. You can only import with REPLACE mode if the table already exists. INSERT mode adds the imported data to the table without changing the existing table data. Specifying a NULL value results in an error. The REPLACE parameter takes an input argument that is a SMALLINT data type.

If you create a schema, table, or column name as a non-delimited identifier, you must pass the name to the import procedure using all uppercase characters. If you created a schema, table, or column name as a delimited identifier, you must pass the name to the import procedure using the same case that was used when it was created.

Import into tables that contain identity columns

You can use the either the SYSCS_UTIL.SYSCS_IMPORT_DATA procedure or the SYSCS_UTIL.SYSCS_IMPORT_DATA_LOBS_FROM_EXTFILE procedure to import data into a table that contains an identity column.

If the identity column is defined as GENERATED ALWAYS, an identity value is generated for a table row whenever the corresponding row field in the input file does not contain a value for the identity column. When a corresponding row field in the input file already contains a value for the identity column, the row cannot be inserted into the table

and the import operation will fail. To prevent such scenarios, the following examples show how to specify parameters in the SYSCS_UTIL.SYSCS_IMPORT_DATA and SYSCS_UTIL.SYSCS_IMPORT_DATA_LOBS_FROM_EXTFILE procedures to ignore data for the identity column from the file, or omit the column name from the insert column list.

If the REPLACE parameter is used during import, Derby resets its internal counter of the last identity value for a column to the initial value defined for the identity column.

The following table definition contains an identity column, `c2` and is used in the examples below:

```
CREATE TABLE tab1 (c1 CHAR(30), c2 INT GENERATED ALWAYS AS IDENTITY,
   c3 REAL, c4 CHAR(1))
```

- Suppose that you want to import data into `tab1` from a file `myfile.del` that does not have identity column information. The `myfile.del` file contains three fields with the following data:

  ```
  Robert,45.2,J
  Mike,76.9,K
  Leo,23.4,I
  ```

  To import the data, you must explicitly list the column names in the `tab1` table except for the identity column `c2` when you call the procedure. For example:

  ```
  CALL SYSCS_UTIL.SYSCS_IMPORT_DATA (NULL, 'TAB1', 'C1,C3,C4',
      null, 'myfile.del',null, null, null, 0)
  ```

- Suppose that you want import data into `tab1` from a file `empfile.del` that also has identity column information. The file contains three fields with the following data:

  ```
  Robert,1,45.2,J
  Mike,2,23.4,I
  Leo,3,23.4,I
  ```

  To import the data, you must explicitly specify an insert column list without the identity column `c2` and specify the column indexes without identity column data when you call the procedure. For example:

  ```
  CALL SYSCS_UTIL.SYSCS_IMPORT_DATA (NULL, 'TAB1', 'C1,C3,C4',
      '1,3,4', 'empfile.del',null, null, null, 0)
  ```

Exporting data using the built-in procedures

You can use the Derby export procedures to export all of the data from table or query, or to export LOB data separately from the other data.

1. Choose the correct procedure for the type of export that you want to perform. For examples of these procedures, see Examples of bulk import and export.

Type of export	Procedure to use
To export all the data from a table to a single export file, including the LOB data	`SYSCS_UTIL.SYSCS_EXPORT_TABLE (IN SCHEMANAME VARCHAR(128), IN TABLENAME VARCHAR(128), IN FILENAME VARCHAR(32672), IN COLUMNDELIMITER CHAR(1), IN CHARACTERDELIMITER CHAR(1), IN CODESET VARCHAR(128))`
To export all the data from a table, and place the LOB	`SYSCS_UTIL.SYSCS_EXPORT_TABLE_LOBS_TO_EXTFILE (IN SCHEMANAME VARCHAR(128),`

data into a separate export file	`IN TABLENAME VARCHAR(128),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128),` `IN LOBSFILNAME VARCHAR(32672))` A reference to the location of the LOB data is placed in the LOB column in the main export file.
To export the result of a SELECT statement to a single file, including the LOB data	`SYSCS_UTIL.SYSCS_EXPORT_QUERY` `(IN SELECTSTATEMENT VARCHAR(32672),` `IN TABLENAME VARCHAR(128),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128))`
To export the result of a SELECT statement to a main export file, and place the LOB data into a separate export file	`SYSCS_UTIL.SYSCS_EXPORT_QUERY_LOBS_TO_EXTFILE` `(IN SELECTSTATEMENT VARCHAR(32672),` `IN TABLENAME VARCHAR(128),` `IN FILENAME VARCHAR(32672),` `IN COLUMNDELIMITER CHAR(1),` `IN CHARACTERDELIMITER CHAR(1),` `IN CODESET VARCHAR(128),` `IN LOBSFILENAME VARCHAR(32672))` A reference to the LOB data is written to the main export file.

Parameters for the export procedures

The Derby export procedures use specific parameters.

SCHEMANAME
: Specifies the schema of the table. You can specify a NULL value to use the default schema name. The SCHEMANAME parameter takes an input argument that is a VARCHAR (128) data type.

SELECTSTATEMENT
: Specifies the SELECT statement query that returns the data to be exported. Specifying a NULL value will result in an error. The SELECTSTATEMENT parameter takes an input argument that is a VARCHAR (32672) data type.

TABLENAME
: Specifies the table name of the table or view from which the data is to be exported. This table cannot be a system table or a declared temporary table. The string must exactly match the case of the table name. Specifying a NULL value results in an error. The TABLENAME parameter takes an input argument that is a VARCHAR (128) data type.

FILENAME
: Specifies the file to which the data is to be exported. If the path is omitted, the current working directory is used. If the name of a file that already exists is specified, the export utility overwrites the contents of the file; it does not append the information. The specified location of the file should refer to the server-side location if you are using the Network Server. Specifying a NULL value results in an error. The FILENAME parameter takes an input argument that is a VARCHAR (32672) data type.

COLUMNDELIMITER
: Specifies a column delimiter. The specified character is used in place of a comma to signify the end of a column. You can specify a NULL value to use the default value of a comma. The COLUMNDELIMITER parameter must be a CHAR (1) data type.

CHARACTERDELIMITER

Specifies a character delimiter. The specified character is used in place of double quotation marks to enclose a character string. You can specify a NULL value to use the default value of a double quotation mark. The CHARACTERDELIMITER parameter takes an input argument that is a CHAR (1) data type.

CODESET

Specifies the code set of the data in the export file. The code set name should be one of the Java-supported character encoding sets. Data is converted from the database code page to the specified code page before writing to the file. You can specify a NULL value to write the data in the same code page as the JVM in which it is being executed. The CODESET parameter takes an input argument that is a VARCHAR (128) data type.

LOBSFILENAME

Specifies the file that the large object data is exported to. If the path is omitted, the lob file is created in the same directory as the main export file. If you specify the name of an existing file, the export utility overwrites the contents of the file. The data is not appended to the file. If you are using the Network Server, the file should be in a server-side location. Specifying a NULL value results in an error. The LOBSFILENAME parameter takes an input argument that is a VARCHAR (32672) data type.

If you create a schema, table, or column name as a non-delimited identifier, you must pass the name to the export procedure using all uppercase characters. If you created a schema or table name as a delimited identifier, you must pass the name to the export procedure using the same case that was used when it was created.

Examples of bulk import and export

All of the examples in this section are run using the `ij` utility.

Example importing all data from a file

The following example shows how to import data into the STAFF table in a sample database from the `myfile.del` file. The data will be appended to the existing data in the table.

```
CALL SYSCS_UTIL.SYSCS_IMPORT_TABLE
   (null,'STAFF','myfile.del',null,null,null,0);
```

Example importing all data from a delimited file

The following example shows how to import data into the STAFF table in a sample database from a delimited data file `myfile.del`. This example defines the percentage character (%) as the string delimiter, and a semicolon as the column delimiter. The data will be appended to the existing data in the table.

```
CALL SYSCS_UTIL.SYSCS_IMPORT_TABLE
   (null,'STAFF','c:\output\myfile.del',';','%',null,0);
```

Example importing all data from a table, using a separate import file for the LOB data

The following example shows how to import data into the STAFF table in a sample database from a delimited data file `staff.del`. The import file `staff.del` is the main import file and contains references that point to a separate file which contains the LOB data. This example specifies a comma as the column delimiter. The data will be appended to the existing data in the table.

```
CALL SYSCS_UTIL.SYSCS_IMPORT_TABLE_LOBS_FROM_EXTFILE(
    null,'STAFF','c:\data\staff.del',',','"','UTF-8',0);
```

Example importing data into specific columns, using a separate import file for the LOB data

The following example shows how to import data into several columns of the STAFF table. The STAFF table includes a LOB column in a sample database. The import file `staff.del` is a delimited data file. The `staff.del` file contains references that point to a separate file which contains the LOB data. The data in the import file is formatted using double quotation marks (") as the string delimiter and a comma (,) as the column delimiter. The data will be appended to the existing data in the STAFF table.

```
CALL SYSCS_UTIL.SYSCS_IMPORT_DATA_LOBS_FROM_EXTFILE
    (null, 'STAFF', 'NAME,DEPT,SALARY,PICTURE', '2,3,4,6',
    'c:\data\staff.del', ',','"','UTF-8',  0);
```

Example exporting all data from a table to a single export file

The following example shows how to export data from the STAFF table in a sample database to the file `myfile.del`.

```
CALL SYSCS_UTIL.SYSCS_EXPORT_TABLE
   (null,'STAFF','myfile.del',null,null,null);
```

Example exporting data from a table to a single delimited export file

The following example shows how to export data from the STAFF table to a delimited data file `myfile.del` with the percentage character (%) as the character delimiter, and a semicolon as the column delimiter from the STAFF table.

```
CALL SYSCS_UTIL.SYSCS_EXPORT_TABLE
   (null,'STAFF','c:\output\myfile.del',';','%',null);
```

Example exporting all data from a table, using a separate export file for the LOB data

The following example shows how to export data from the STAFF table in a sample database to the main file `staff.del` and the LOB export file `pictures.dat`.

```
CALL SYSCS_UTIL.SYSCS_EXPORT_TABLE_LOBS_TO_EXTFILE(null,'STAFF'
    'c:\data\staff.del',',','"','UTF-8', 'c:\data\pictures.dat');
```

Example exporting data from a query to a single export file

The following example shows how to export employee data in department 20 from the STAFF table in a sample database to the file `awards.del`.

```
CALL SYSCS_UTIL.SYSCS_EXPORT_QUERY
   ('SELECT * FROM STAFF WHERE dept=20',
   'c:\output\awards.del',null,null,null);
```

Example exporting data from a query, using a separate export file for the LOB data

The following example shows how to export employee data in department 20 from the STAFF table in a sample database to the main file `staff.del` and the lob data to the file `pictures.dat`.

```
CALL SYSCS_UTIL.SYSCS_EXPORT_QUERY_LOBS_TO_EXTFILE(
    'SELECT * FROM STAFF WHERE dept=20',
    'c:\data\staff.del', ',' ,'"',
    'UTF-8','c:\data\pictures.dat');
```

Import and export procedures from JDBC

You can run import and export procedures from a JDBC program.

The following code fragment shows how you might call the SYSCS_UTIL.SYSCS_EXPORT_TABLE procedure from Java. In this example, the procedure exports the data in the `staff` table in the default schema to the `staff.dat` file. A percentage (%) character is used to specify the column delimiter.

```
PreparedStatement ps=conn.prepareStatement(
    "CALL SYSCS_UTIL.SYSCS_EXPORT_TABLE (?,?,?,?,?,?)");
    ps.setString(1,null);
    ps.setString(2,"STAFF");
    ps.setString(3,"staff.dat");
    ps.setString(4,"%");
    ps.setString(5,null);
    ps.setString(6,null);
    ps.execute();
```

How the Import and export procedures process NULL values

In a delimited file, a NULL value is exported as an empty field. The following example shows the export of a four-column row where the third column is empty:

```
7,95,,Happy Birthday
```

The import procedures work the same way; an empty field is imported as a NULL value.

CODESET values for import and export procedures

Import and export procedures accept arguments to specify codeset values. You can specify the codeset (character encoding) for import and export procedures to override the system default.

The following table contains a sample of the character encoding that is supported by JDK 1.x. To review the complete list of character encodings, refer to your Java documentation.

Table 3. Sample character encodings
This table contains sample character encodings supported by JDK1.x.

Character Encoding	Explanation
8859_1	ISO Latin-1
8859_2	ISO Latin-2
8859_7	ISO Latin/Greek
Cp1257	Windows Baltic
Cp1258	Windows Vietnamese
Cp437	PC Original
EUCJIS	Japanese EUC
GB2312	GB2312-80 Simplified Chinese
JIS	JIS
KSC5601	KSC5601 Korean
MacCroatian	Macintosh Croatian
MacCyrillic	Macintosh Cyrillic
SJIS	PC and Windows Japanese
UTF-8	Standard UTF-8

Examples of specifying the codeset in import and export procedures

The following example shows how to specify UTF-8 encoding to export to the `staff.dat` table:

```
CALL SYSCS_UTIL.SYSCS_EXPORT_TABLE
    (NULL,'STAFF','staff.dat',NULL,NULL,'UTF-8')
```

The following example shows how to specify UTF-8 encoding to import from the `staff.dat` table:

```
CALL SYSCS_UTIL.SYSCS_IMPORT_TABLE
    (NULL,'STAFF','staff.dat',NULL,NULL,'UTF-8',0)
```

Storing jar files in a database

`SQLJ.install_jar`, `SQLJ.remove_jar`, and `SQLJ.replace_jar`, are a set of procedures in the SQL schema that allow you to store jar files in the database.

Your jar file has a *physical name* (the name you gave it when you created it) and a *Derby name* (the Derby identifier you give it when you load it into a particular schema). Its Derby name is an *SQL92Identifier*; it can be delimited and must be unique within a schema. A single schema can store more than one jar file.

Adding a Jar File

To add a jar file using SQL syntax:

```
CALL SQLJ.install_jar('jarFilePath', qualifiedJarName, 0)
```

-
- jarFilePath

  The path and physical name of the jar file to add or use as a replacement. For example:

  d:/todays_build/tours.jar
- qualifiedJarName

  The Derby name of the jar file, qualified by the schema name. Two examples:

  ```
  MYSCHEMA.Sample1
  ```

  ```
   -- a delimited identifier.
  MYSCHEMA."Sample2"
  ```

Removing a jar file

To remove a jar file using SQL syntax:

```
CALL SQLJ.remove_jar (qualifiedJarName, 0)
```

Replacing a jar file

To replace a jar file using SQL syntax:

```
CALL SQLJ.replace_jar('jarFilePath', qualifiedJarName)
```

- jarFilePath

  The path and physical name of the jar file to add or use as a replacement. For example:

  d:/todays_build/tours.jar
- qualifiedJarName

  The Derby name of the jar file, qualified by the schema name. Two examples:

  ```
  MYSCHEMA.Sample1 -- a delimited identifier.
  ```

  ```
  MYSCHEMA."Sample2"
  ```

Installing a jar example

- Complete SQL example for installing a jar:

```
CALL SQLJ.install_jar('d:\todays_build\tours.jar',
'APP."ToursLogic!"', 0);
```

For more information about storing classes in a database, see the *Java DB Developer's Guide*.

sysinfo

Use the `sysinfo` utility to display information about your Java environment and Derby (including version information). To use `sysinfo`, do one of the following:

- If you are relatively new to the Java programming language, follow the instructions in "Setting up your environment" in *Getting Started with Java DB* to set the `DERBY_HOME` and `JAVA_HOME` environment variables and to add `DERBY_HOME/bin` to your path. Then use the following command:

  ```
  sysinfo
  ```
- If you are a regular Java user but are new to Derby, set the `DERBY_HOME` environment variable, then use a `java` command to invoke the `derbyrun.jar` file:

  ```
  (UNIX) java [options] -jar $DERBY_HOME/lib/derbyrun.jar sysinfo
  ```

  ```
  (Windows) java [options] -jar %DERBY_HOME%\lib\derbyrun.jar sysinfo
  ```
- If you are familiar with both the Java programming language and Derby, you have already set `DERBY_HOME`. Set your classpath to include the Derby jar files. Then use a `java` command to invoke the `sysinfo` class directly.

  ```
  java org.apache.derby.tools.sysinfo
  ```

sysinfo example

When you run the `sysinfo` command using the `derbyrun.jar` file, the output looks something like this:

```
java -jar C:\db-derby-10.5.1.1-bin\lib\derbyrun.jar sysinfo
------------------ Java Information ------------------
Java Version:    1.6.0_13
Java Vendor:     Sun Microsystems Inc.
Java home:       C:\jdk1.6.0_13\jre
Java classpath:  C:\db-derby-10.5.1.1-bin\lib\derbyrun.jar
OS name:         Windows XP
OS architecture: x86
OS version:      5.1
Java user name:  user1
Java user home:  C:\Documents and Settings\user1
Java user dir:   C:\DERBYDBS
java.specification.name: Java Platform API Specification
java.specification.version: 1.6
--------- Derby Information --------
JRE - JDBC: Java SE 6 - JDBC 4.0
[C:\db-derby-10.5.1.1-bin\lib\derby.jar] 10.5.1.1 - (764942)
[C:\db-derby-10.5.1.1-bin\lib\derbytools.jar] 10.5.1.1 - (764942)
[C:\db-derby-10.5.1.1-bin\lib\derbynet.jar] 10.5.1.1 - (764942)
[C:\db-derby-10.5.1.1-bin\lib\derbyclient.jar] 10.5.1.1 - (764942)
------------------------------------------------------
----------------- Locale Information -----------------
Current Locale : [English/United States [en_US]]
Found support for locale: [cs]
         version: 10.5.1.1 - (764942)
Found support for locale: [de_DE]
         version: 10.5.1.1 - (764942)
Found support for locale: [es]
         version: 10.5.1.1 - (764942)
Found support for locale: [fr]
         version: 10.5.1.1 - (764942)
Found support for locale: [hu]
         version: 10.5.1.1 - (764942)
Found support for locale: [it]
```

```
         version: 10.5.1.1 - (764942)
Found support for locale: [ja_JP]
         version: 10.5.1.1 - (764942)
Found support for locale: [ko_KR]
         version: 10.5.1.1 - (764942)
Found support for locale: [pl]
         version: 10.5.1.1 - (764942)
Found support for locale: [pt_BR]
         version: 10.5.1.1 - (764942)
Found support for locale: [ru]
         version: 10.5.1.1 - (764942)
Found support for locale: [zh_CN]
         version: 10.5.1.1 - (764942)
Found support for locale: [zh_TW]
         version: 10.5.1.1 - (764942)
------------------------------------------------------
```

When you request help for a problem by posting to the derby-user mailing list, include a copy of the information provided by the `sysinfo` utility.

Using sysinfo to check the classpath

sysinfo provides an argument (*-cp*) which can be used to test the classpath.

```
java org.apache.derby.tools.sysinfo -cp
[ [ embedded ][ server ][ client] [ tools ] [ anyClass.class ] ]
```

If your environment is set up correctly, the utility shows output indicating success.

You can provide optional arguments with *-cp* to test different environments. Optional arguments to *-cp* are:

- embedded
- server
- client
- tools
- *classname*.class

If something is missing from your classpath, the utility indicates what is missing. For example, if you neglected to include the directory containing the class named *SimpleApp* to your classpath, the utility would indicate this when the following command line was issued (type all on one line):

```
$ java org.apache.derby.tools.sysinfo -cp embedded SimpleApp.class
FOUND IN CLASS PATH:

Derby embedded engine library (derby.jar)


NOT FOUND IN CLASS PATH:

user-specified class (SimpleApp)
(SimpleApp not found.)
```

dblook

Use the dblook utility to view all or parts of the Data Definition Language (DDL) for a given database. To use the dblook utility, do one of the following:

- If you are relatively new to the Java programming language, follow the instructions in "Setting up your environment" in *Getting Started with Java DB* to set the DERBY_HOME and JAVA_HOME environment variables and to add DERBY_HOME/bin to your path. Then use the following command:

  ```
  dblook -d connectionURL [options]
  ```
- If you are a regular Java user but are new to Derby, set the DERBY_HOME environment variable, then use a java command to invoke the derbyrun.jar file (all on one line):

  ```
  (UNIX) java [options] -jar $DERBY_HOME/lib/derbyrun.jar dblook
            -d connectionURL [options]
  ```

  ```
  (Windows) java [options] -jar %DERBY_HOME%\lib\derbyrun.jar dblook
            -d connectionURL [options]
  ```
- If you are familiar with both the Java programming language and Derby, you have already set DERBY_HOME. Set your classpath to include the Derby jar files. Then use a java command to invoke the dblook class directly.

  ```
  java org.apache.derby.tools.dblook -d connectionURL [options]
  ```

Using dblook

The syntax for the command to launch the dblook utility is:

```
dblook -d connectionURL [options]
```

The value for *connectionURL* is the complete URL for the database. Where appropriate, the URL includes any connection URL attributes that might be required to access the database. For complete information on connection URL attributes, see "Setting attributes for the database connection URL" in the *Java DB Reference Manual*.

For example, to connect to the database 'myDB', the URL would simply be 'jdbc:derby:myDB'; to connect using the Network Server to a database 'C:\private\tmp\myDB' on a remote server (port 1527), the URL would be:

```
'jdbc:derby://localhost:1527/
"C:\private\tmp\myDB";user=someusr;password=somepwd'
```

As with other Derby utilities, you must ensure that no other JVMs are started against the database when you call the dblook utility, or an exception will occur and will print to the dblook.log. If this exception is thrown, the dblook utility will quit. To recover, you must ensure that no other Derby applications running in a separate JVM are connected to the source database. These connections need to be shutdown. Once all existing JVMs running against the database have been shutdown, the dblook utility will execute successfully. You can also start the Derby Network server and run the dblook utility as a client application while other clients are connected to the server.

dblook options

The dblook utility options include:

-z <schemaName>

specifies the schema to which the DDL should be restricted. Only objects with the specified schema are included in the DDL file.

-t <tableOne> <tableTwo> ...
specifies the tables to which the DDL should be restricted. All tables with a name from this list will be included in the DDL file subject to `-z` limitations, as will the DDL for any keys, checks, or indexes on which the table definitions depend.

Additionally, if the statement text of any triggers or views includes a reference to any of the listed table names, the DDL for that trigger/view will also be generated, subject to `-z` limitations. If a table is not included in this list, then neither the table nor any of its keys, checks, or indexes will be included in the final DDL. If this parameter is not provided, all database objects will be generated, subject to `-z` limitations. Table names are separated by whitespace.

-td
specifies a statement delimiter for SQL statements generated by dblook. If a statement delimiter option is not specified, the default is the semicolon (';'). At the end of each DDL statement, the delimiter is printed, followed by a new line.

-o <filename>
specifies the file where the generated DDL is written. If this file is not specified, it defaults to the console (i.e. standard System.out).

-append
prevents overwriting the DDL output ('-o' parameter, if specified) and "dblook.log" files. If this parameter is specified, and execution of the `dblook` command leads to the creation of files with names identical to existing files in the current directory, `dblook` will append to the existing files. If this parameter is not set, the existing files will be overridden.

-verbose
specifies that all errors and warnings (both SQL and internal to `dblook`) should be echoed to the console (via System.err), in addition to being printed to the "dblook.log" file. If this parameter is not set, the errors and warnings only go to the "dblook.log" file.

-noview
specifies that CREATE VIEW statements should not be generated.

Generating the DDL for a database

The `dblook` utility generates all of the following objects when generating the DDL for a database:

- Checks
- Functions
- Indexes
- Jar files
- Keys (primary, foreign, and unique)
- Schemas
- Stored procedures
- Triggers
- Tables
- Views
- Roles

Note: When dblook runs against a database that has jar files installed, it will create a new directory, called `DERBYJARS`, within the current directory, and that is where it will keep copies of all of the jars it encounters. In order to run the generated DDL as a script, this `DERBYJARS` directory must either 1) exist within the directory in which it was created,

or 2) be moved manually to another directory, in which case the path in the generated DDL file must be manually changed to reflect to the new location.

The `dblook` utility ignores any objects that have system schemas (for example, SYS, SYSIBM), since DDL is not able to directly create nor modify system objects.

dblook examples

The following examples demonstrate how the various `dblook` utility options can be specified from a command line. These examples use the `sample` database.

Note: The quotations marks shown in these examples are part of the command argument and must be passed to `dblook`. The way in which quotation marks are passed depends on the operating system and command line that you are using. With some systems it might be necessary to escape the quotation marks by using a forward slash before the quotation mark, for example: `"\"My Table"\"`

Status messages are written to the output (either a -o filename, if specified, or the console) as SQL script comments. These status messages serve as headers to show which types of database objects are being, or have been, processed by the `dblook` utility.

Writing the DDL to the console
You can write the DDL to the console for everything that is in the `sample` database. In this example, the database is in the current directory. For example:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample
```

Including error and warning messages in the dblook command
You can write error and warning messages when you write the DDL to the console. The messages are written using `System.err`. For example:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -verbose
```

Writing the DDL to a file
You can write the DDL to a file called `myDB_DDL.sql` for everything that is in the `sample` database. In this example, the database and file are in the current directory. For example:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -o myDB_DDL.sql
```

Specifying directory paths in the dblook command
If the database or file are not in the current directory, you must specify the directory paths. For example:

```
java org.apache.derby.tools.dblook -d
 'jdbc:derby:c:\private\stuff\sample'
   -o 'C:\temp\newDB.sql'
```

Specifying a schema in the dblook command
You can specify the schema for the database. To write the DDL to the console, for all of the objects in the `sample` database where the database is in the SAMP schema, use the following command:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -z samp
```

Specifying a remote database and host
If the `sample` database is in the SAMP schema on localhost:1527, you must specify your user ID and password. For example, use the following command to write the DDL to the console:

```
java org.apache.derby.tools.dblook
   -d 'jdbc:derby://localhost:1527/"C:\temp\sample";
   user=someusername;password=somepassword' -z samp
```

Specifying a schema and a table within the database in the dblook command

You can specify that only the objects in the `sample` database that are associated with the SAMP and the `My Table` table are written to the console. For example:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -z samp -t "My
 Table"
```

Specifying multiple tables in the dblook command

You can specify more than one table in the dblook command by separating the names of the tables with a space. For example, for objects in the `sample` database that are associated with either the `My Table` table or the `STAFF` table, use the following command:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -t "My Table"
 staff
```

Writing DDL to a file without a statement delimiter

To write the DDL for all of the objects in`sample` database to the `myDB_DDL.sql` file without a statement delimiter, you must omit the default semi-colon. You can append the DDL to the output files if the files are already there. For example:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample
   -o myDB_DDL.sql -td '' -append
```

Excluding views from the DDL

To write the DDL to the console for all of the objects in the `sample` database except for views, use the following command:

```
java org.apache.derby.tools.dblook -d jdbc:derby:sample -noview
```

SignatureChecker

Use the `SignatureChecker` tool to identify any SQL functions and procedures in a database that do not follow the SQL argument matching rules described in "Argument matching" in the *Java DB Reference Manual*. If your application uses SQL functions and/or procedures, you should run this tool against your databases.

Using SignatureChecker

Before you run the `SignatureChecker` tool, make sure that your classpath contains the Derby jar files, including *derbytools.jar*.

On a Java SE platform, run the `SignatureChecker` tool as follows, where *connection-url-to-database* is the connection URL you would use in order to obtain a connection by calling *DriverManager.getConnection()*:

```
java org.apache.derby.tools.SignatureChecker connection-url-to-database
```

Alternatively, you can invoke the tool using *derbyrun.jar*. For example:

```
java -jar derbyrun.jar SignatureChecker "jdbc:derby:myDB"
```

On a Java ME platform, run the `SignatureChecker` tool as follows, where *database-name* is the database name you would set by calling *EmbeddedSimpleDataSource.setDatabaseName()*:

```
java org.apache.derby.tools.SignatureChecker database-name
```

The tool examines every routine registered in the database and displays results like the following:

```
Found a matching method for: "APP"."DOINSERT"( )
Found a matching method for: "APP"."DOINSERTANDCOMMIT"( )
Found a matching method for: "APP"."APPENDFOOANDBAR"( VARCHAR )
Unresolvable routine: "APP"."IDONTEXIST"( VARCHAR , INTEGER ).
Detailed reason: No method was found that matched the method call
 z.iDontExist(java.lang.String, int),
tried all combinations of object and primitive types and any possible
 type conversion for any parameters the method call may have.
The method might exist but it is not public and/or static, or the
 parameter types are not method invocation convertible.
Found a matching method for: "APP"."RUNDDL"( VARCHAR )
Unresolvable routine: "APP"."TABFUNCDOESNTEXIST"( VARCHAR , BIGINT ).
Detailed reason: No method was found that matched the method call
 org.apache.derbyTesting.functionTests.tests.lang.TableFunctionTest.
 appendFooAndBar(java.lang.String, long),
tried all combinations of object and primitive types and any possible
 type conversion for any parameters the method call may have.
The method might exist but it is not public and/or static, or the
 parameter types are not method invocation convertible.
```

In the example above, the `SignatureChecker` tool found matches for all routines except for the functions *app.iDontExist* and *app.tabFuncDoesntExist*. If the tool cannot find a match for one of your functions or procedures, it tells you what signature it expected to find. You need to adjust your application in one of the following ways:

- **Method:** Change the signature of your Java method to match the signature suggested by the `SignatureChecker` tool.

- **Routine:** Drop and recreate your function or procedure so that its arguments and return type match your Java method according to the SQL Standard rules described in "Argument matching" in the *Java DB Reference Manual*.

Trademarks